PERCEIVED ATTRIBUTES OF DIFFUSION OF INNOVATION THEORY AS PREDICTORS OF INTERNET ADOPTION AMONG THE FACULTY MEMBERS OF IMAM MOHAMMED BIN SAUD UNIVERSITY

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The Internet is the most common communication and research tool worldwide. Perusal of the World Wide Web quickly reveals the variety of information available. Internet adoption can be considered the late 20th century's most important event. In academic environments today, Internet use among faculty members has been widely expanded, with professors now integrating Internet technology into classroom activities.

Imam Muhammad Bin Saud Islamic University (IMSU) is a pioneering public university in Saudi Arabia. Until recently, some faculty members at IMSU were unable to access the Internet through the university. It is important to study the effects of this delay on faculty members regarding research and academic activities.

This study identified the statistically significant differences in demographic characteristics of Internet adopters and non-adopters among faculty members at IMSU, exmined whether faculty members' perceptions of the Internet affected adoption, determined if the university administration's decisions impacted faulty members' decisions to adopt the Internet, identified factors motivating faculty members to adopt the Internet, identified obstacles influencing faculty members' decisions to use the Internet, and determined whether innovation characteristics as perceived by faculty members predicted Internet adoption.

Using Rogers' diffusion of innovation theory, the influence of eight attributes were examined regarding Internet adoption among IMSU faculty members. Multiple regression and Chi-square techniques were conducted to analyze the data and answer research questions.

Statistically significant differences were identified among Internet adopters and non-adopters regarding gender, age, academic rank, discipline, and English proficiency.

The data revealed 54.7% of IMSU faulty members used the Internet for research and academic activities twice a month or less, indicating a low Internet adoption rate. Statistically significant differences were noted among adopters and non-adopters relative to income level and English proficiency. Multiple regression analysis showed that all attributes of innovation individually predicted Internet adoption. The combination of all attributes indicated the model could predict Internet adoption among faculty.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Background of the Study

The Internet has become the most common communication and research tool for most people worldwide. The attractive display of materials on the Internet motivates individuals to explore and use it in their daily lives. A quick look at the content on the World Wide Web gives a clear picture of the variety of information resources and communication applications it contains. These resources and applications cover millions of multipurpose Web sites including images, sounds, and graphical user interfaces which allow users to interact positively with the contents. In addition, the Internet makes the publishing, access, retrieval, and distribution of information from resources not only possible but also easy for any user regardless of their location.

In spite of the emergence of many forms of innovations for storing and delivering information, the Internet has remained the most valuable source of information. In fact, the diffusion of Internet adoption can be considered as the most important event of the late 20th century (Vadillo, Bárcena, & Matute, 2006). This can be seen from the prevalence of using the Internet for different purposes in the community among all age groups and grade levels, from pre-K students to university faculty members.

Researchers from different disciplines have become aware of the potential benefits of the Internet not only as a research tool but also as a communication medium. Multiple communication applications provided by the Internet encourage scholars and professionals to keep in contact with each other regularly and exchange information in a short period of time. To conduct their research studies, scholars and university faculty members have access to a wide

variety of services, including information sources, electronic mail, file transfer, interest group membership, interactive collaboration, and multimedia displays (Cohen, n.d.).

In academic environments, support and motivation for faculty members to use the Internet increase the quality and quantity of scholarly communication, which in turn improves research productivity and academic tasks (Henry, 2002; Ankem, 2004). Since the academic environment is a place where much research is conducted, a number of Internet applications are related to accomplishing research studies. Browner, Pulsford, and Sears (2000) attributed scholarly interest in the Internet to the following reasons:

> 1. The Internet is an enormous, in some way unique, academic resource. In many important aspects, the Internet is a new kind of library, an electronic library of libraries, with text, pages, books, collections of books, and collection of collections.
> 2. The Internet is immediately accessible, quite easy to search, and easier to use than the typical university library. For some kinds of information, the Internet is much the quickest route; for other kinds, which are on the increase, the Internet is the only source available. (p.158)

Harmon and Jones (1999) divided research activities using the Internet into three categories: use as a resource locator, use to complete demographic survey, and use for empirical investigation. Therefore, Web-based research has been found to be very accommodating for academic purposes. The Web has been popular among researchers because of the convenience it affords in collecting and tracking information from different forms of sources such as educational blogs, professional listservs, and electronic journals. According to Ahern (2005), university faculty members now find this type of research not only useful to search for information or communicate with colleagues but also valuable for interviewing, reaching vulnerable population, validating instruments, and conducting virtual focus groups.

Today, Internet use among faculty members is no longer limited to research purposes. It has been widely expanded, with professors now integrating Internet technology into classroom activities. When developing a new course, teaching a class for the first time, or looking for new ideas, faculty members find multiple supportive materials through the Internet such as syllabi, educational sites, discussion lists, and helpful assignments. Additionally, online courses are a common implementation of the Internet in academic activities.

Statement of the Problem

Saudi Arabia has 14 public universities and 3 private universities. Imam Muhammad bin Saud Islamic University is a public university and one of the pioneer universities in Saudi Arabia. The university is located in Riyadh, the capital of Saudi Arabia. The Riyadh Institute of Science was established in 1950 and served as the foundation of the current university. In 1953, the College of Islamic Law was created to be the first academic school in the university. One year later, the College of Arabic Language was created. Despite of the existence of these two colleges, they were not considered a university until September 10, 1974, when the Council of Minister passed the new regulation of The Imam Muhammad bin Saud Islamic University. Currently, the university has 74 schools in different levels of education.

Saudi Arabia was late in connecting the Internet to the public compared to other countries. As a result, Imam Mohamed Bin Saud Islamic University was provided with Internet connection at a later period, and the faculty, until a short time ago, was unable to access the Internet through the university. Therefore, it is important to study the effect of this lateness in adopting the Internet for academic and research purposes by faculty.

Although the Internet is becoming more popular among faculty members, there is still no evidence of the nature and intention of that adoption. As in other societies, researchers in Saudi Arabia are attentive to obtaining information through new forms of information resources.

Research has revealed that 75% of faculty members and graduate students use the Internet; most of them aim to find information related to their research and to new discoveries in their fields of study (Al-Dubian, 2003). In contrast, other research indicated that Saudi faculty members use the Internet more for personal needs and rarely use it for academic activities (Al-Asmari, 2005). Another study found Saudi faculty members' adoption of the Internet for academic purposes appears to be in an early stage of diffusion (Al-Fulih, 2002). This difference in usage rate might be attributed to the academic discipline as a factor influencing the decision to adopt or not adopt the Internet (Alshawi, 2002). Hence, more studies are needed to explain and predict faculty members' level of adoption and perceptions of the Internet.

Universities' administrations have the motivation and desire to provide all faculty members with the Internet regardless of their disciplines (Alshawi, 2002). Yet, the awareness of the significance of Internet content and applications for research and instructional purposes seems to need more investigation to spread Internet utilization among all faculty members.

Significance of the Study

Research activities and conducting new studies have always relied on new innovations that are used to store and deliver information. Communicative technologies and electronic resources are common means of obtaining current information. Thus, researchers often use these sources to find new ideas to study. Today, Internet technology, with its multiple integrated features and applications, allows people to conduct research more quickly and more conveniently. The Internet, as a means to collect information for research purposes, can be faster than any other type of information source to track and distribute new ideas. Additionally, information on the Internet can be accessed more easily and faster as compared to other traditional sources such as libraries.

The Internet currently provides all educational institutions with knowledge and necessary information for teaching and research. Specifically, university faculty members can utilize the Internet to help them track new information in their fields in order to continue their academic achievements. Harmon and Jones (1999) outlined five different uses of the Internet in education that can be used to support faculty members:

1. Informational Web use
2. Supplemental Web use (providing some course content)
3. Essential Web use (students cannot participate productively in courses without regular access to the Web)
4. Communal Web use (online classes that also meet face to face)
5. Immersive Web use (all course content and course interactions are online).

These five levels can be categorized into two main usages: the Internet as a source of information and as a tool to deliver information. The first use is now the most common among faculty members since the Internet currently has a great deal of up-to-date information in different fields. Abdelraheem and Almusawi (2003) revealed that while the Internet is mostly used as an information providing source among university faculty members, it is also used for homework assistance, providing feedback, and as a chatting tool.

Faculty members hold favorable attitudes toward the Internet and incorporate online technology for instructional purposes (Vodanovich & Piotrowski, 2001). However, older teachers tend to use the Internet less when compared with younger teachers (Lazinger, Bar-llan, & Peritz, 1997). This finding indicates that more training accompanied with raising the awareness of the significance of the technology in education are needed among older faculty members in order for them to catch up on online information.

The study is significant because of several reasons. First, it provides clarification of the factors and predictors influencing faculty members to adopt new innovations, especially the Internet. Identifying these variables is a major key to understanding the aspects of resistance or acceptance in order to overcome barriers encountered by faculty members when trying to use new technologies.

The study is also an attempt to explore the extent of adoption in the academic environment of IMSU. Discovering the attitudes and barriers preventing faculty members from accepting the Internet as a new innovation will draw a more clear picture for educational policy makers in Saudi Arabia to assist them in evaluating electronic media in universities and in overcoming negative perceptions which inhibit faculty members from applying Internet technology in their academic tasks.

Furthermore, this study is a contribution to the literature focusing on the attributes of new innovations that affect Saudi faculty members in accepting or rejecting new technology. Faculty members are one of the groups who are expected and required to go along with new technologies and take advantage of their functions in all academic activities. Therefore, it is critical to explore Internet use among that group. Moreover, the findings of this study can be used to increase the role of research organizations, educational institutes, and libraries by providing them with essential information to spread awareness and training among non-adopters.

The IMSU administration might benefit from this study by comprehending the value of Internet implementation in the university in order to assess the need for a broader extension or modification of the available technology. The results of this study support diffusion of innovations theory to achieve the proliferation of the Internet in Saudi Arabia. The theoretical framework of the study is the attributes of innovation affecting its diffusion, so there is a need to

examine these attributes in Saudi Arabian universities. This will assist in designing better methods to ensure the adoption of the Internet.

The significance of the study can be summarized as the following:

1. To help administrators and policy makers evaluate faculty members' Internet skills and knowledge in order to decide the best approach to educate them about the importance of integrating the Internet in their academic tasks.

2. Understanding faculty information seeking behavior will lead to decreasing the gap between adopters and non-adopters and between different disciplines.

3. To provide insight into factors and predictors impacting faculty members' decision whether to adopt or not adopt the Internet.

4. To motivate faculty members to expand their knowledge and skills in using the Internet for research activities.

5. To contribute to the evaluation process of ongoing effort to diffuse the Internet in Saudi Arabia by providing some guidelines that might be useful for Internet implementation strategy.

Research Questions

The following research questions will be investigated to achieve the purpose of the study:

1. To what extent do faculty members at IMSU adopt the Internet for academic purposes?

2. Are there any significant differences in demographic characteristics among Internet adopters and non-adopters in IMSU?

3. How does the university administration impact faculty member's desire to adopt the Internet?

4. Does the relative advantage attribute of innovation as perceived by faculty members predict their Internet adoption?

5. Does the compatibility attribute of innovation as perceived by faculty members predict their Internet adoption?

6. Does the results demonstrability attribute of innovation as perceived by faculty members predict their Internet adoption?

7. Does the ease of use attribute of innovation as perceived by faculty members predict their Internet adoption?

8. Does the image attribute of innovation as perceived by faculty members predict their Internet adoption?

9. Does the visibility attribute of innovation as perceived by faculty members predict their Internet adoption?

10. Does the voluntariness attribute of innovation as perceived by faculty members predict their Internet adoption?

11. Does the trialability attribute of innovation as perceived by faculty members predict their Internet adoption?

Limitation of the Study

This study focuses on Internet adoption as a new innovation, so the findings might not be generalized to other forms of electronic resources. The study population includes faculty members who have PhD degrees, which means the findings do not apply to other faculty members who have Master's and Bachelor's degrees. In addition, IMSU emphasizes religious studies; therefore, the findings may not be applied to other universities in the country that focus on different academic programs.

In IMSU, some academic programs have been established recently; these programs have a small number of faculty members compared to other old programs. Thus, findings related to

demographic differences in terms of disciplines might not be accurate enough to be generalized to all other similar disciplines.

Most faculty members do not have or do not release their email addresses. The university as well does not have a comprehensive list that includes email addresses for the university community. Therefore, a paper copy of the questionnaire was distributed instead of a Web-based survey or an email survey. This inhibition delayed collecting the data because I had to find someone in Saudi Arabia to distribute the questionnaires, follow up with faculty members and departments, and return the completed questionnaires.

A great number of faculty members are not fluent in English because they studied and obtained their degrees from Saudi Arabia universities, where courses are taught in Arabic. This required that the original instrument be translated to Arabic language so all faculty members could understand and answer all questions. Although the necessary processes were applied to ensure the validity and reliability of the Arabic version, the translation may have had some affects on the meaning of questions or deliver different concepts than what the original instrument attempts to address.

Definition of Terms

The Internet: an electronic network that provides access to millions of information resources and Web sites worldwide by linking computers from different sectors including universities, government agencies, and research facilities.

Perception of the Internet: the feelings, attitudes, and images that faculty members have regarding the use of the Internet for research and academic activities.

Internet adoption: faculty members' acceptance of using the Internet as a part of their research and academic tasks.

Information technology: any new technology, including computer hardware and software, telecommunication tools, and information networks that allow users to transmit, process, store, organize, and retrieve information for the purpose of problem solving or decision making.

Innovation: practices, objects, or ideas that are perceived as new by an individual or other unit of adoption (Rogers, 2003).

Diffusion: the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003).

Internet application: Services provided via the Internet to search for information or communicate with others such as telnet, email, listserv, and the Web.

Faculty member: any instructor in the university that holds a PhD degree.

Electronic resource: a manifestation of a work that requires the use of a computer for access. The manifestation's carrier is accessed either directly (e.g., via CD-ROM) or remotely (e.g., via the Internet). Items that do not require the use of a computer, such as audio CDs or movies on DVD-videodiscs, are excluded from this definition (Library of Congress, 2003).

Ease of use: "The degree to which an individual believes that using a particular system would be free of physical and mental effort." (Davis, 1993, p. 477).

Result demonstrability: the tangibility of the results of using an innovation, including observability and communicability (Moore & Benbasat, 1991).

Visibility: the degree to which others can see that an innovation is being used (Benham & Raymond, 1996).

Trialability: the degree to which an innovation may be experimented with on a limited basis. The trial provides individuals with less uncertainly and gives them the opportunity to learn and practice by doing (Rogers, 2003).

Image: “the degree to which use of an innovation is perceived to enhance one’s image or status in one’s social system” (Moore & Benbasat, 1991, p. 175).

Voluntariness: “the degree to which use of innovation is perceived as being voluntary or of free will” (Moore & Benbasat, 1991, p. 175).

CHAPTER 2

LITERATURE REVIEW

The present study will examine faculty members affecting universities faculty members who utilize the Internet in their research and academic tasks. To provide a background for the topic, conducting a review of the related literature is vital for gaining insight into the situation of diffusion of Internet adoption among faculty members.

This chapter is divided to five sections. The first section addresses the establishment of the Internet in Saudi Arabia and the relevant regulation related to its implementation in the country. The second section describes demographic characteristics which might have an impact on faculty members' perceptions toward the use of the Internet. The third section examines research focusing on Internet adoption worldwide in Saudi Arabia, the United States, and developing countries. The fourth section provides an overview of adoption of new technology. The focus of the last section concerns the diffusion of innovations theories, specifically Rogers' model of diffusion of innovations and technology acceptance model (TAM).

Internet in Saudi Arabia

Academic institutes were the first sector in Saudi Arabia to connect to the Internet before it was made for public. This initial step was started by King Fahad University of Petroleum and Minerals (KFUPM) in the city of Dhahran in 1993 through the Portal Company of the United States. Due to the low speed of Internet connection at that time, only email was provided to the KFUPM community (Al-Tawil, 2001). Later, King Abdulaziz City for Science and Technology (KACST) provided Internet service to KFUPM using a 64 kbps channel from King Faisal Specialist Hospital and Research Center (KSHRC). In 1995, KACST performed the first attempt to connect more Saudi universities to the Internet through KSHRC, which was connected to the Internet through its own satellite station (Al-Hajery, 2004).

The correlation of these three firms was the beginning of the need to manage Internet service in Saudi Arabia. Therefore, KACST was registered as the .sa domain manager to coordinate Internet service within the kingdom (Al-Tawil, 2001). During that period, Internet service was not provided for public users officially except for a limited number of people who had to dial to other countries to get connected, paying expensive international calling charges. The official beginning of public connection to the Internet by local Internet service providers (ISP) occurred in February 1999. This significant initiation was based on the Saudi Arabian's Council of Ministers' decision on March 3, 1997, to launch the Internet in the country. Al-Furaih (2002) stated the major provisions of the decision as follows:

1. All telecommunication links must be provided by Saudi Telex, Mail and Telephone Ministry. The responsibility was later transferred to the Saudi Telecommunication Company (STC).

2. KACST should create a department called the Internet Services Unit (ISU) to supervise the connection point of the Internet in Saudi Arabia, so all Internet traffic in the county must go through ISU. Also, ISU has to raise the public awareness with the Internet and formulate the rules and regulations that govern the use of the Internet in the country.

3. KACST has to provide the Internet service directly to all Saudi universities and governmental research centers.

4. A permanent security committee headed by the Ministry of Interior is to be formed. The committee will have members from other government agencies to discuss issues related to Internet security and filtering.

5. The Internet is to be provided to the public through commercial ISPs who are licensed by KACST.

As stated in the decision, KACST has the primary responsibility to introduce Internet service in terms of organization and operation. As a result, KACST works cooperatively with STC to provide necessary communication lines to the Internet. On October15, 1998, STC ran the first line to connect KACST to UUNET in New York. King Saud University then was the first organization to connect to the Internet through KACST followed by several ISPs (Al-Hajery, 2004). In 2003, the responsibility of organizing the Internet service transferred to the Saudi Communication Commission which now issues licenses for local ISPs.

Saudi Arabia's late connection to the Internet has been attributed to the nature of the country's people. Saudi Arabia is a conservative society where alcohol beverages, gambling, drugs, and prostitution are forbidden in Islamic law (Al-Furaih, 2002). The Internet as an open source contains much information that is uncontrolled by any organization. People in Saudi Arabia, therefore, do not want forbidden objects to be accessed by the community. This resulted in delaying Internet services in the country in order to find an effective filtering system that can block disallowed Web sites. As a result, all requested Web sites from Saudi Arabia ISP users must go through an ISU proxy to be filtered. For this purpose, a list of addresses for banned sites is maintained regularly by the filtering system, which is updated daily based on the content filtering policy (ISU, n.d.). If any user tries to access a prohibited Web site, he or she is directed to another page notifying him or her that the Web site is inaccessible (see Figure 1).

Despite the recent connection to the Internet, Saudi Arabia Internet users are growing rapidly (Table 1). For example, the number of users in December 2000 was 200,000, and it had increased to 2,540,000 users in 2005. Saudi Arabia is currently the second fastest growing country in the Middle East regarding growth in Internet usage (Internet usage in the Middle East, n.d.).

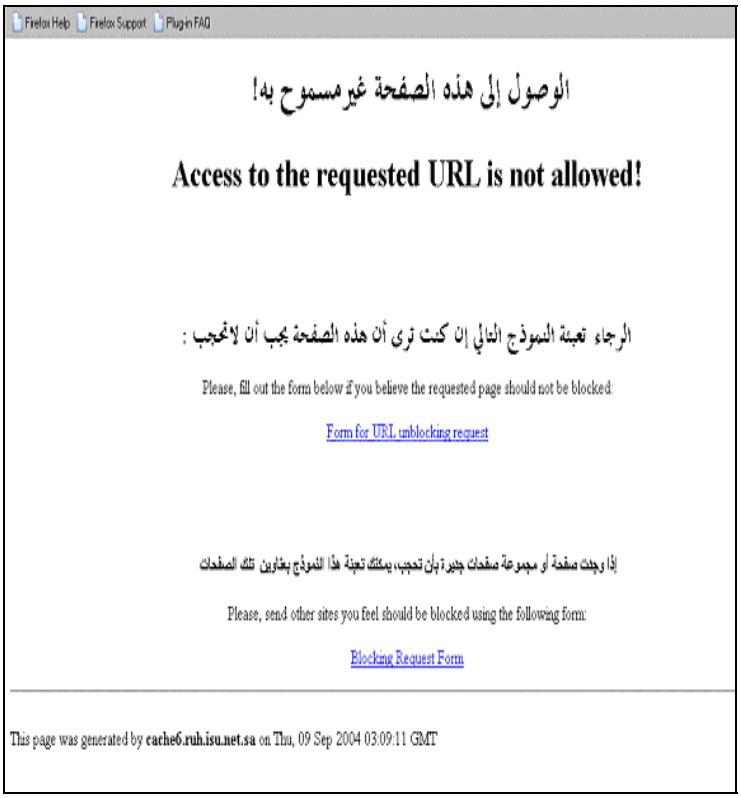


Figure 1. Displayed information when accessing a blocked Web site.

Table 1

Internet Use Growth in Saudi Arabia

Year	Users
1998	20,000
1999	100,000
2000	460,000
2001	1,016,208
2002	1,418,880
2003	1,500,000
2004	2,050,000
2005	2,450,000

Filtering System in Saudi Arabia

Based on the Council of Ministers' decree issued 2001 concerning the regulated use of the Internet in Saudi Arabia, all sites that contain content in violation of Islamic tradition or national regulations shall be blocked. Therefore, Saudi Arabia has applied a sophisticated filtering system to control Internet content. A security committee chaired by the Ministry of Interior has been formulated. One of the tasks assigned to this committee is the selection of sites to be blocked and the oversight of this process.

The filtering system prohibits people within Saudi Arabia from accessing certain contents of the Internet by managing the gateway used by all the local Internet service providers. Blocked Web sites include pornographic Web pages (which constitutes 95% of all blocked Web pages); pages related to drugs, bombs, alcohol, and gambling; and pages insulting the Islamic religion or Saudi Arabia laws and regulations (ISU, n.d.).

ISU was initially in charge of maintaining the censorship system. In 2004, this mission was transferred to the STC. A central log is maintained, and specialized proxy equipment processes all page requests from within the country, comparing them to a black list of banned sites. If the requested page is included in the black list then it is dropped; otherwise the request is executed. Black lists are purchased from commercial companies and renewed on a continuous basis throughout the year. This commercial list is then enhanced with various prohibited Web sites added locally by trained staff.

The censorship list is not available to the public; however, the filtering process is openly described. The filtering policy clearly identifies which types of content the system tries to block. Users also receive a blocked page when attempting to access a prohibited Web site explaining that the site is blocked and why it is filtered (OpenNet Initiative, 2005).

If a user tries to access a blocked Web page, another page states in Arabic and in English that "Access to the requested URL is not allowed." This page contains links to two forms, one to request the site be unblocked and one where users can suggest other sites to be blocked. Thus, users are invited to participate in the blocking process to a limited degree.

Demographics

The use of online resources is affected by demographic characteristics of people, and these characteristics differ in the strength of their impact. With regard to faculty members, the most common factors that influence their use of electronic resources are age, academic discipline, gender, and income level.

Age

The relationship between age and computer use appears to be strong. Age is one of the critical factors that affects the adoption of any new technology (Al-Erieni, 1999). Researchers found adopters of new communication technologies are younger than non-adopters due to the fact that younger people are more adventurous in trying new innovations (Rogers, 1995). Henry (2002) also stated that the older the faculty member, the less apt he or she is to use the Internet globally.

Generally speaking, the older members of a community resist new emergences, and only a few will accept the challenge to explore the Internet. In the United States, for example, Internet use at home declines with age, reaching only 30.5% participants for those between the ages of 55 and 64 and much less for older people (Newberger, 2001). The Internet use studies in Canada also show low usage among older people. In fact, research conducted over a 5-year period shows that the highest rate in Internet use in the country is seen in the youngest age group, less than 35 years old, and the second youngest group, 35 to 54 years old (Corbeil, 2005). With other forms

of electronic resources, Mayfield and Thomas (2005) reported that younger faculty members make more frequent use of electronic full-text journals than older faculty members.

Although older individuals are the lowest age group for using the Internet, they are responsible for the biggest growth in Internet access. The Media Audit (2004) reported that Internet use in the 55 to 64 age classification has increased from 9.5% of the total Internet audience to 11.3% in the past 4 years. The percentage of those in that same age group who access the Internet regularly increased from 45.8 % in 2000 to 56.7% in 2003.

Discipline

Adopting the Internet as a research or teaching tool is very common among faculty; however, the extent of Internet use varies based on discipline affiliation. Although the science faculty members might not carry out their own literature research and information gathering, one study concluded that science faculty members have a higher use of the Internet than faculty members of other discipline (Flaxbart, 2001). Abdelraheem and Al Musawi (2003) found significant differences in Internet use in favor of scientific colleges. In addition, a study by Lazinger, et al. (1997) concluded that medical school faculty members showed higher computer and Internet use than humanities and social science faculty members.

Gender

Looking at the general use of computer applications, more men engage in these applications and perform online dissemination of publications than women (Henry, 2002). Al-Saif (2005) revealed that male faculty members use the Internet for instructional purposes and Web-based instruction (WBI) more often than female faculty, which supports Schifter's (2000) findings that female faculty members were not attracted to using the technology. However, the use in the last few years reverses in favor of women. Day, Janus, and Davis (2005), as shown in Figure 2, indicated that men's use of computers at home was 20% more than women's use 1984.

The gap then started to decrease until 2001 when women's use became higher than men's. The new nature of activities that can be performed online, which gives women more opportunities to use the computer for activities such as shopping, might affect this difference between genders. For example, men go online in greater numbers than women for a vast but scattered array of activities. Women outpace men for a small number of activities, including the areas of health, medicine, and religion (Whitty, 2005).

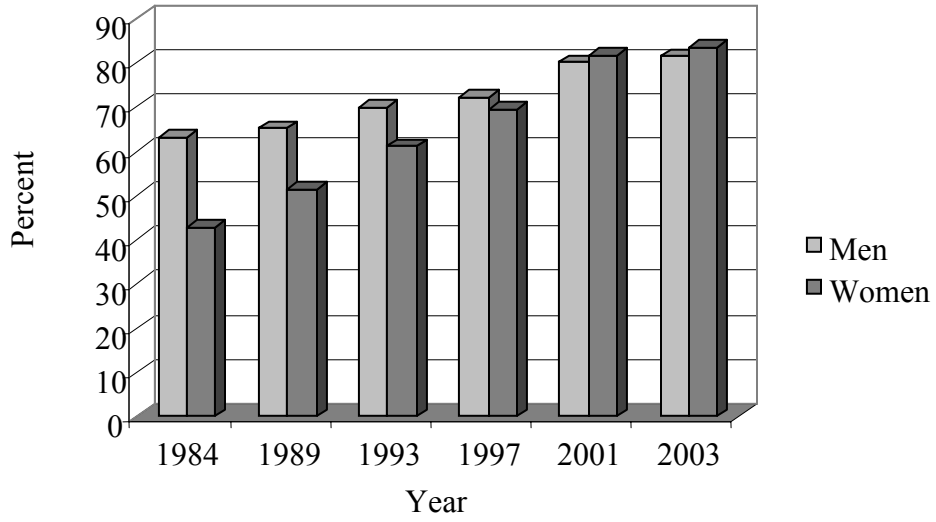


Figure 2. Computer use by gender.

In developing countries, surprisingly, it seems that no difference in the use of computers, especially the Internet, exists between male and female faculty members (Abdelraheem & Almusawi, 2003; Anduwa-Ogiegbaen & Isah, 2005). This similarity in the use between genders might be attributed to the similarity in tasks for both males and females in the academic environment. Therefore, this finding cannot be generalized to the entire world population.

Income Level

Lin (1998) categorized Internet adopters according to user's income level. Individuals with the highest level were the most likely to adopt the Internet. Individuals with a moderate were likely to use the Internet in the future. Individuals at a poor income level were the least likely to adopt the Internet. According to Rogers (1995), adopters of new technology are more upscale because people with a higher income can afford the financial needs of the new technology.

On the other hand, Busselle, Reagan, Pinkleton, and Jackson (1999) stated that income level is not a significant factor in the academic environment because most faculty members have free access to the Internet. Jeffers and Atkin (1996) found that income and education had an inversely weak relationship with interest in adopting specific Internet utilities such as sending or receiving messages and ordering goods, even when the Internet was still in the early stages of diffusion. They argued that those applications might be less expensive substitutes for functions performed by traditional media.

Worldwide Internet Adoption

The Internet is a very common information research tool that is used by people with different interests. University faculty members are one group that is supposed to utilize the Internet for academic purposes. In addition to the characteristics of faculty members, mentioned previously, the region or the country where people work plays a major role in the decision to adopt the Internet. For example, a comparative study of home computer adoption in the United States, Sweden, and India showed that Indian households are still behind those of the United States and Sweden (Shih & Venkatesh, 2003). The reason for the difference in use might be attributed to the various infrastructural and cultural factors in countries' communities. Cultural differences around the world result in both divergent attitudes toward technology and culturally distinctive ways of implementing and utilizing technologies (Tully, 1998). Universities between

countries differ in the abilities and support regarding the technology use provided to their faculty members. Therefore, it is important to identify the situation of faculty members' use of the Internet in different parts of the world in order to discover and compare the differences.

Researchers' Internet Adoption in Saudi Arabia

Al Saif (2005) studied the use of the Internet for instructional purposes in the University of Qassim. The goal of the study was to identify the motivating and inhibiting factors that affect the use of Web-based instruction (WBI) and to examine any differences in these factors based on selected faculty members characteristics (demographics, computer and Internet skills, access, and attitude) and technology use (computer, Internet, and WBI use). The results showed that faculty members in general demonstrated positive attitudes toward using technology, especially the Internet, for instructional purposes. The remarkable finding of the study was that faculty members were self-motivated to engage in computer and Internet activities to improve their teaching performance and adopt new teaching methods for their courses.

Al Saif (2005) also found a relationship between faculty members' characteristics regarding age, gender, academic rank, and the use of technology. For example, younger faculty members were more likely to use the computer and the Internet than older faculty members. The researcher concluded that the newer and younger faculty members were being hired with the expectation that they would integrate technology in classroom activities. Another finding in the study showed that male faculty members used the Internet more often than female faculty members. However, female faculty members demonstrated more positive attitudes toward using the Internet and WBI in learning activities than male faculty members. Al Saif believed the difference in use might be attributed to the level of access to technology available to the male faculty members as opposed to the female faculty members.

Al-Dubian (2003) studied the use of the Internet by female researchers. The goal of the study was to understand female researchers' benefits and motivations to the Internet for obtaining information in five Saudi universities. The study also aimed to identify the major barriers preventing researchers from taking advantage of the Internet in their research. Al-Dubian found that the majority of participants (75%) use the Internet mostly to communicate with others through email. The study identified six barriers inhibiting participants from using the Internet. These barriers in priority were:

1. Slow connection.
2. Difficulty in connecting to the Internet.
3. Frequent disconnection.
4. Time.
5. Few Arabic search engines.
6. Inaccuracy of information.

Al-Asmari (2005) investigated the use of the Internet by teachers of English as a foreign language (EFL) in Saudi Arabian college of technology. The purpose of the study was to explore the relationship of teachers' use of the Internet with four variables: personal characteristics, the level of accessing the Internet, perceived computer and Internet expertise, and the participants of the Internet as a tool for instruction. The author applied quantitative (a questionnaire) and qualitative (interview) methods to collect needed data for the study. Study participants used the Internet rarely for instructional purposes and mostly for personal needs, which increased the level of Internet use in mainstream Internet services such as email and the World Wide Web. The results also confirmed the existence of a positive correlation between teachers' level of use of the Internet and independent variables including computer and Internet expertise, place of accessing the Internet, perception of the advantages of the Internet, and computer and Internet experience.

A major finding of the study indicated that teachers need more Internet training, focusing on using it as a tool for teaching and learning.

Al-Far (2005) aimed to identify to what extent Teachers' College faculty members use the Internet in teaching and research, to what extent the Internet is important in their perspective, and their purpose in using it. The researcher applied a questionnaire method consisting 86 statements. The results of the study indicated that 73% of the participants used the Internet for research or teaching. However, only 3.63% of the Internet users were connected to the Internet in their college offices, which indicated the lack of connection in the colleges. The study also revealed that the lack of training in using Internet applications as well as the difficulty of dealing with the English language were the most common problems that faculty members encountered when accessing the Internet. In addition, the findings did not reveal any statistically significant differences among participants concerning the effect of ethnicity and academic major.

Al-Salih (2004) researched graduate students' information needs in Saudi Arabian universities, the level of these needs, and the extent to which the needs were being met in relation to accessing and utilizing electronic resources. The conceptual framework of the study was grounded in Derving's sense-making theory. Al-Salih used Kari's modification of sense-making to clarify the research questions and to achieve the goals of the study. Findings indicated that the Internet and the electronic catalog were used the most among libraries' electronic resources. However, English language proficiency was a common barrier in the seeking stage. Thus, participants were likely discouraged and limited their research using electronic resources since most resources were available only in English.

Al-Hazmi (2004) investigated the status of using the Internet by teachers and students at Teachers' College in the Makkah region. The researcher followed the descriptive approach to collect and analyze data. The study found that 66.7% of teachers used the Internet for different

purposes. The results also revealed the existence of significant differences concerning the use of the Internet across the following variables: college, major, and owning a computer. The study determined the most important purposes for being online were using email, reading newspapers, and seeking information. On the other hand, the most common barriers facing the participants were slow browsing response time and the frequent disconnection from the Internet. Other limitations to using the Internet included the lack of a devoted budget for Internet implementation in teaching and education, insufficient numbers of computers and appropriate programs in libraries so the Internet applications can be effectively utilized in the educational environment, insufficient number of computers connected to the Internet for public use, and the lack of information and training programs concerning the use of the Internet for faculty members.

Al-Khabra (2003) identified the barriers of adopting the Internet from the perspective of faculty members at Educational College at King Saud University. The study applied a descriptive and analytical approach using a questionnaire survey to collect data. The study findings revealed that faculty members are not provided with computers, computer labs have insufficient Internet access, educators are not motivated to use technology, technical support is unavailable, Internet connection are slow, security issues are present, English proficiency is low, Internet costs are high of, and many faculty members are unaware of the importance of the Internet.

Sait, Al-Tawil, Ali, and Khan (2003) explored the effects of the Internet in the field of education, especially on teachers and students in Saudi Arabia. The results found that male teachers agreed with the potential of the Internet for education, realized the effort involved, and utilized the Internet effectively. Due to low Internet skills among most of the students, teachers supported the emphasis of awareness and training programs to help students overcome obstacles while using the Internet. The study also revealed that although the Internet increased students'

understanding and motivation, the problem of plagiarism and unethical practices exist. To deal with this situation, the researchers suggested that faculty members emphasize effective deterrents such as demonstrating clear examples of what is not ethical. In the study, the majority of teachers thought the Internet has enhanced their own knowledge and helped them to keep updated with information related to their courses. They also believed the Internet has facilitated improvement in curriculum and teaching methods; however, the teachers emphasized the need for the new methods to be supplemental to traditional classroom teaching and not a replacement. The results showed that teachers with strong Internet skills were more likely to use Internet applications in course content preparation.

Al-Fulih (2002) examined Rogers' attributes of the Internet as perceived by Saudi Arabian faculty members for academic purposes and how their perception can be used to predict their adoption of the Internet for academic purposes. Using a questionnaire survey, the study implied that the adoption of the Internet among Saudi Arabian faculty members appeared to be in an early stage of diffusion. The results showed that 55% of faculty members did not use the Internet. This high number of non-users might be attributed to the nature of the Internet as a new innovation at that time. Al-Fulih also found that faculty members encountered different types of barriers which prevented or reduced their Internet use. These barriers included limited availability and quality of access, negative perceptions, administration and technical support, lack of experience, limited English proficiency, security and fire wall issues, high cost, research habits, frustration, information availability and credibility, and research difficulty.

Al-Fulih (2002) reported that some faculty members believed the current state of communication and campus networking among universities would not help the diffusion of the Internet in Saudi Arabian universities. Faculty members also reported that improving communication and networking infrastructures would require huge investment plans, which

cannot be afforded by current information technology budgets. Moreover, some participants predicted the quality of Internet access would get worse in the future due to high demand on available bandwidth from non-academic sources.

Al-Salem (2005) conducted a study to explore Saudi Arabian English as a Foreign Language (EFL) females' self-image, their developing perception of their environment, and their changing social attitudes as a result of using the Internet. The author applied a qualitative research design using two methods: Interviews by email and analysis of documents from the Online Writing Collaborative Project (OWCP). The findings revealed Internet use positively influenced the participants in several ways. The participants reported their Internet experiences broadened their knowledge, improved their writing skills, and stimulated their critical thinking. The Internet also provided the participants with easy access to a great deal of information that was not previously available to them. This rich source of varied information available online helped participants explores the world, see things differently, and transcend the limitations of their previous perceptions.

Internet Adoption in the United States

It is expected that the use of Internet in the United States is greatly popular among university faculties because it is the country in which the Internet was initially established. In fact, universities were pioneers in connecting to the Internet and enhancing its effectivity. This resulted in the richness of Internet studies dealing with faculty members.

Bradshaw (2000) investigated the purpose and skills of using the Internet by faculty members from colleges and universities in the Southern United States. Bradshaw also sought to compare response rate of faculty members who participated in the study using the Internet versus pen and paper. The findings revealed that respondents had positive perceptions toward using the Internet in their research. They expected to benefit from the Internet for background research

more this year than last year and more next year than the current year. Because of this trend, Bradshaw concluded that the demand for information on the Internet from providers of information providers, such publishers and libraries, will increase. More material will be furnished through the Internet in ways that are accessible or without a subscription charge. The study findings showed that faculty members felt more comfortable using with the Internet for research, and thus considered it a valuable tool. Faculty members would likely access the Internet more frequently as they become aware of how the Internet would be helpful to them. Bradshaw noted a marked difference response rate between the two methods of survey administration.

Alshawi (2002) examined faculty members' level of Internet use in four northern Virginia universities. The purpose of the study was to describe, investigate, and understand faculty members' Internet use for educational activities. Alshawi also aimed to identify the major factors influencing faculty members' adoption of the Internet as well as to examine possible relationships among the factors of gender, age, academic discipline, computer skills, and available university resources. A cross-sectional survey research design was employed to gather needed data. A preliminary interview with some faculty members was conducted to get a better understanding of faculty members' opinions in regard to Internet use. The finding showed that communication was the primary purpose of using the Internet, followed by research and teaching. In fact, the majority of participants agreed on the increasing use of electronic communication in their daily activities. They identified email as the most common application to communicate with others. Computer skills were the strongest predictors of faculty member Internet use. A negative relationship existed between Internet use and age. Gender, available university resources, and academic discipline were not related to the level of intrnetuse among the faculty members.

Busselle et al. (1999) examined the factors affecting adoption of the Internet by faculty members at Washington State University. The study tested Internet use with Lin's (1998) motivation scales of adoption factors including resources, need for innovativeness, complexity, advantage, media use, technology cluster, and demographics as predictors of Internet use. Buselle et al. conducted a telephone questionnaire using four variables: frequent use of the Internet, perceptions of the Internet, media use technologies owned, and demographics. The major findings of the study were as follows: The four factors found in Lin's (1998) study were replicated with different strength, gender and age were significant predictors of Internet use, owning technology were a predictor of frequent Internet use, and those participants who reviewed the Internet as less complex and saw more advantages to using the technology were heavier Internet users.

Jones and Johnson-Yale (2005) investigated the Internet's impact on college faculty. The purpose of the study was to explore the Internet's influence on teaching and research, its impact on the interaction between faculty members and teachers, faculty members' perceptions of students' use of the Internet, and the use of particular Internet applications. A Web-based survey was implemented, and calls for participation in the study were distributed through academic and scholarly email lists and through campus-wide email lists at numerous college campuses in the United States. Jones and Johnson-Yale found the Internet helped faculty members overcome some of the traditional barriers in teaching and research. The study results indicated the Internet is likely to be a supplemental tool rather than a substitute for traditional teaching mediums. However, participants lacked the skills required to master new technologies because of a lack of training on how to use the technologies as well as insufficient technical support. Institutions of higher education still need to address the broad areas of infrastructure, professional development, teaching, and research in regard to Internet use.

Dewald (2005) surveyed full-time and part-time business faculty in Pennsylvania State University to identify their use of free Web resources in subscription databases for their own and their students' research. A questionnaire survey adapted from Herring (2001) was modified to focus on attitudes towards students' use of both the Web and library databases. Dewald found that part-time and full-time faculty members used Web resources in approximately equal proportion (75% and 73%). He also found that faculty members accepted Web resources for their research as well as their students' research. In fact, a high number of faculty members either required or encouraged their students to use the Web more than using other electronic resources, and a large majority allowed the use of electronic databases along with other forms of resources.

Dewald and Silvius (2005) surveyed business faculty members in order to assess their satisfaction with Web information compared with subscription database usage. The survey measured five factors of user satisfaction: content, accuracy, format, ease of use, and timeline. The study reported significantly higher levels of Web usage than subscription databases usage; however, faculty members were not satisfied with free Web information sources for their own professional research. This dissatisfaction was attributed to the lack of decision-relevant data, the reliability of Web, and the organization of information. In contrast, the most common problems of using databases included difficulties, confusion, and lack of knowledge in using electronic resources.

Herring (2001) studied faculty members' attitudes toward using the World Wide Web as a research source. She considered two types of information: the acceptance of the Web and the influence of academic discipline on faculty members' willingness to utilize the Internet. The author used a questionnaire instrument to measure the same factors of Dewald and Silvius' study (2005) which included content, accuracy, ease of use, format, and timeline. Herring concluded that faculty members accepted the Web as a suitable research tool for their own use. However,

they questioned both accuracy and reliability of much of the information on the Web. They also did not think the Web was a sufficient resource for scholarly research. Community colleges faculty members were more satisfied with content and accuracy than faculty members at four-year colleges or universities. This may be attributed to the kinds of research conducted at post-secondary institutions, as compared to universities, or it may reflect the small number of relative resources available at community colleges.

Internet Use Among Faculty Members in Developing Countries

Abdelraheem and Almusawi (2003) investigated the extent to which the Omani Sultan Qaboos University faculty members use the Internet for instructional purposes. The main instrument was a questionnaire survey distributed to 193 faculty members representing all disciplines. Questionnaire items were developed by generating a list of possible uses of the Internet that were taken from Becker (2000). The dependant variable of the study was the instructional uses as measured by faculty members'responses. The independent variables were colleges, gender, experience, and academic rank. Abdelraheem and Almusawi (2003) found differences in the use of the Internet in terms of college affiliation in favor of science faculty members, experience in favor of faculty members who had 5 to 9 years of experience, and academic rank in favor of assistant professors. Most recurring uses of the Internet were to download ready-made instructional materials, access reference materials, obtain self-learning materials, communicate with others by email, develop students' skills in searching for information, and enrich textbooks. These uses showed that the Internet was mostly utilized to obtain information.

Adika (2003) investigated the impact of the Internet in finding up-to-date information by faculty members in three major universities in Ghana. He aimed to provide basic information on some issues related to the adoption of the Internet among faculty members such as the frequency

of use and the motivation to access the Internet. Data were collected using a questionnaire survey aiming to gather information about awareness and inspiration to use Internet services, faculty skills in using search engines to locate information, purpose for accessing the Internet, and relevance and accuracy of information.

Adika (2003) distributed a questionnaire to a sample of 130 participants from three universities in Ghana. Adika found that Internet use in Ghana was still very low among faculty members. In fact, 29 % of the participants indicated they rarely or never used search engines to locate information, and 32.5 % never used the Internet. The remaining 39.5% of the participants indicated that they always use email to communicate with their peers. Adika attributed the low Internet usage rate to lack of access. The majority of the university departments did not have Internet connections, mainly because of the high cost of connectivity compared to developed countries.

Aduwa-Ogiegbean and Isha (2005) investigated the extent of faculty members' use of Internet services for instructional purposes in the University of Benin, Nigeria. The study was conducted to determine the most popular reasons of Internet usage among faculty members as well as to determine the role of gender in such usage. The data collection tool was a questionnaire containing 18 items that were found to represent the most frequent uses of the Internet for classroom applications in a developing country like Nigeria. Aduwa-Ogiegbaen and Isah found that the most recurrent use of Internet was correlated to seeking promotion. Promotion seeking activities included identifying reputable journals available for publishing articles and searching for information to write articles. The reason for this common use of the Internet was attributed to the criteria of evaluating faculty members for advancement in position, which requires publishing a certain number of articles in refereed journals. The study also found

no difference in the use of the Internet between men and women, which indicated that gender plays no role among faculty members, at least where users of the Internet is concerned.

Nasir Uddin (2003) measured the level of Internet usage for information and communication needs by faculty members of the University of Rajshahi, Bangladesh. To achieve this goal, five categories of activities were identified: emailing, browsing, downloading, using newsgroups, and recreation. The major finding of the study revealed that the Internet is not popular among faculty members mainly because of the high cost of communication systems in the country. Results also showed that academic rank was a significant predictor to identify the level of Internet use and the priority of information needs. While lectures' information needs, for instance, were focused on higher study opportunities and literary publication, junior academics focus on their career plans for future research. The findings also identified some difficulties and barriers which produced hesitance to use the Internet. These included insufficient speed to browse and download information due to having only two leased lines from an ISP connecting most departments in the university. Thus, Nasir Uddin believed that providing broadband

Internet access would assist in overcoming some barriers and spread the use of Internet among more faculty members.

Adoption of Technology

Adopting new innovations is one of the major areas in information technology that has been researched extensively in order to determine the primary factors influencing people to accept technologies and implement them in their activities. Dillon and Morris (1996) define user acceptance as "the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support" (p. 4). The strong relationship between the use of an innovation and the use of other information technology products led Shin &Venkatesh, (2003) to examine different types of technology such as computers, VCRs, and the Internet.

They concluded that more attention should be paid to understanding how existing technologies are currently being used by community members and how they interact with other technologies.

Determination of technology usage can be characterized by both the rate of usage and the variety of ways in which the technology is used (Dutton, Kovaric & Steinfield, 1985). While usage variety may be driven by available features and interaction in myriad usage situations, usage rate depends on the users' task requirements (Shih & Venkatesh, 2003).

Many factors and predictors affect users' decisions and the rate of adoption, including an innovation's characteristics and economic, sociological, organizational, and psychological variables (Butler & Sellbom, 2002). According to Shih and Venkatesh (2003), a positive attitude toward the consequences of technology use results in a high rate of adoption. Davis, Bagozzi, and Warshaw (1989) believe the primary motivation for computer adoption and use is the adopter's belief regarding usage outcome or the perception of the usefulness of the technology itself.

Social influence also plays a significant role in determining acceptance factors and new adopters' behavior regarding new information technologies (Malhotra & Galletta, 1999). When a society in general complains about a technology, the complaints may have a negative effect on users of the technology. In contrast, users' feelings of internalization and identification generated by social influence might have a positive effect on the users' attitudes toward accepting the new technology. Thus, the consideration of social influence and how it affects users' commitment to incorporate use of new information systems seems important for understanding, explaining, and predicting system usage and acceptance behavior

Diffusion of Innovation

Diffusion is defined as the process by which an innovation is adopted and accepted by members of a certain community (Surry & Farquhar, 1997). Rogers (2003) defined it as the

process that an innovation needs to spread through communication channels over time among people in the community.

The fast growth of knowledge has lead to the existing multiple forms of technology. Many diffusion of innovations theories, as a result, have emerged in order to study community members' acceptance of these innovations. Researchers in a number of disciplines have used these theories to comprehend the factors influencing people to accept or reject technologies. Diffusion of innovation theories have spread all around the world because they offer a conceptual framework for discussing the process of acceptance at a global level (Dillon & Morris, 1996). These theories form a general framework of the social impact of technologies on community and provide insight into the characteristics of technology that may influence specific groups to adopt them.

In spite of the availability of various theories, there is no comprehensive theory that has been agreed upon by all or most researchers. The cause of the lack of a unified theory is attributed to the newness of the diffusion of innovations field which has its roots in rural sociology research of the 1940s (Rogers & Scott, 1997).

Surry and Farquhar (1997) categorize diffusion of innovation applications into two groups. The first category focuses on the reform and restructuring of educational institutions. The goal of this category is to develop theories of organizational change. These theories involve the adoption of a wide range of innovative technologies and practices. This group is called macro theories. Micro theories are the second category that focuses on increasing the adoption and utilization of specific instructional products. The goal of this category is to develop theories of technology adoption that will lead to a more widespread use of instructional innovations.

Diffusion of Innovations Theory

Rogers' diffusion of innovation model is the most widely tested and implemented model (Engel, Blackwell, & Miniard, 1995). Although the model does not adequately provide a basis for predicting outcomes as well as providing guidance as to how to accelerate the rate of adoption, it is best applied to the socio-economic issues of information and communication technology in the social system (Minishi-Majanja & Kiplang'at, 2005).

Rogers (2003) defines an innovation as any new idea, practice, or object perceived as a new emergence. The newness in Rogers' perception is not only limited to new knowledge, but it might also include persuasion or decision to adopt. Diffusion, on the other hand, is defined as the process that an innovation needs to spread through communications channels over time among people in the community. According to this definition, Rogers identified four elements of diffusion of innovation. The first element is the innovation which consists of two components: hardware and software. Although innovations are mainly hardware, they might be completely composed of information. Communication channels and mediums used to exchange information between community members are another defined element of diffusion. In this context, diffusion is a type of communication in which the content of the exchange message is related to an innovation. The third element is the time involved in diffusion which consists of the innovation-diffusion process, innovativeness, and an innovation's rate of adoption. Social system, the fourth element, is a group of interrelated units that are engaged together to accomplish a common goal.

Rogers (1995) modeled innovation-decision process which an individual passes through when encountering new innovations or ideas. The process is essentially information-seeking and information-processing activities starting from obtaining initial knowledge about the innovation, to forming an attitude toward it, to deciding to adopt or reject, to implementing the new idea, and finally to confirming the decision made (Rogers. 2003)

As show in Figure 3, the process of Rogers' (2003) diffusion of innovations theory consists of five sequential stages:

1. Knowledge occurs when an individual or other decision-making unit is exposed to an innovation's existence and gains some understanding of how it functions. There are three sorts of knowledge:

a. Awareness-knowledge (information that an innovation exists).

b. How-to-knowledge (information necessary to use an innovation properly).

c. Principles-knowledge (dealing with the functioning principles underling how the innovation works).

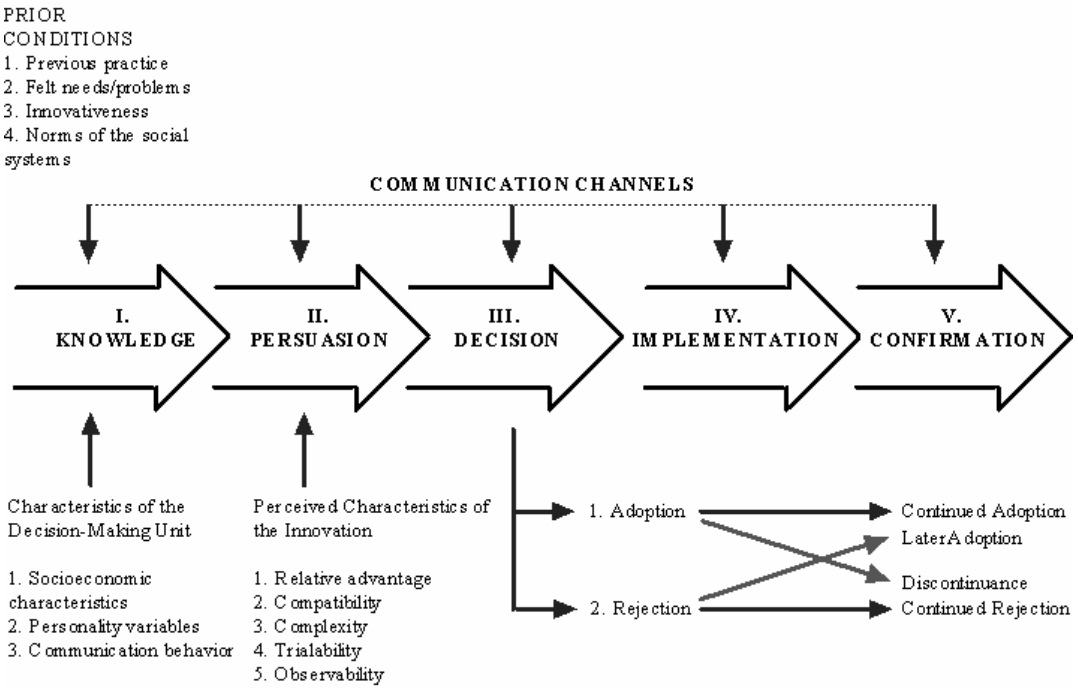


Figure 3. Diffusion of innovation model (Rogers, 2003, p. 170).

2. Persuasion occurs when an individual forms a favorable or unfavorable attitude toward the innovation based on perceived characteristics of the innovation, such as relative advantage and complexity.

3. Decision occurs when an individual engages in activities that lead to a choice to adopt or reject the innovation.

4. Implementation occurs when an individual puts the innovation into use.

5. Confirmation occurs when an individual seeks reinforcement of an innovation decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation.

Attributes of Innovations

Regardless of the nature and characteristics of people, the properties of an innovation itself affect its rate of adoption in the society. Rogers (2003) identifies five characteristics of innovations that help to explain different rates of adoption:

1. Relative advantage: the degree of considering the innovation is better alternative of the applied object. The greater degree individual perceives the advantages of an innovation, the more rapid its rate of adoption will be.

2. Compatibility: the degree of the consistency of the innovation with the existing values, past experience, and needs for potential adopters. If an idea is in consistent with the values of the society, it will not be adopted in the same rapidity as if it is compatible.

3. Complexity: innovations degree of difficulty to be understood and used. New ideas that are easy to comprehend are adopted more rapidly than those that require new skills.

4. Trialability: the degree to which an innovation may be experimented with on limited bases. The trial provides individuals with less uncertainly and gives them the opportunity to learn and practice by doing.

Observability is the degree to which the result of the innovation is visible to others. The visibility of positive result of the innovation enhances the possibility to be adopted.

Rogers (2003) claims that from 49 to 87 percent of the variance in the rate of adoption of any new innovation is explained by the five attributes mentioned previously. He also stated that the rate of adoption can be affected by other variables: the type of innovation-decision, the nature of communication channel diffusing the innovation in the innovation-decision process, the nature of social system, and the extent of change agents' promotion efforts in diffusing the innovation (Figure 4).

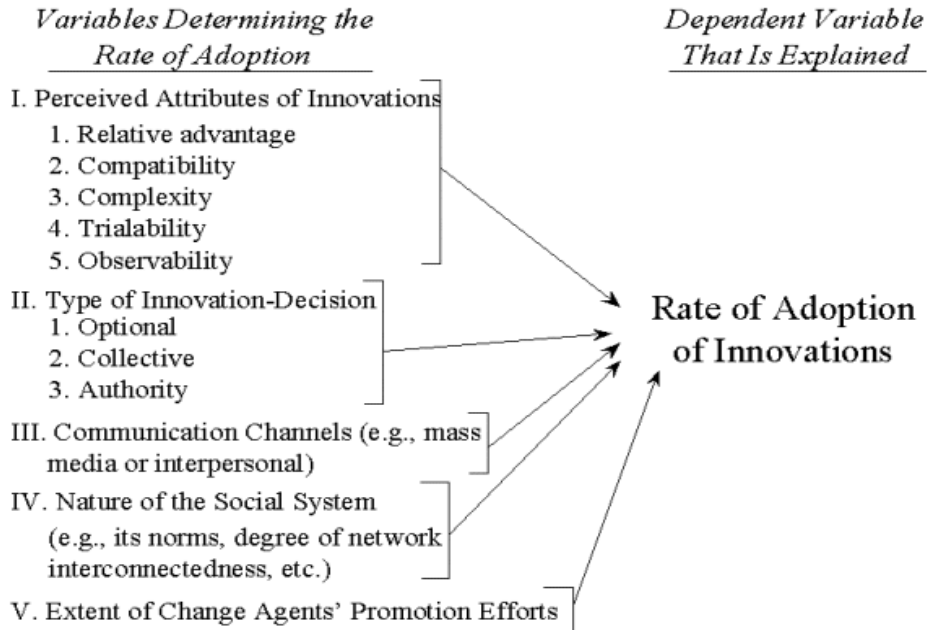


Figure 4. Variables determining the rate of adoption of innovations (Rogers, 2003, p. 222).

Technology Acceptance Model

The technology acceptance model (TAM) is an information systems theory developed by Davis in 1986 to model how users come to accept and use a technology (Malhotra & Galletta, 1999). The theoretical basis of this model lies in the Theory of Reasoned Action (TRA) (Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004).

The goal of TAM is to give "an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis et al., 1989, p 989). Another purpose of TAM is to provide a basis for explaining the impact of external factors on internal beliefs, attitudes, and intentions. To achieve these goals, TAM identifies fundamental variables suggested by previous research dealing with the cognitive and affective determinants of computer acceptance, and uses TRA as a theoretical background for modeling the theoretical relationships among the variables.

TAM suggests that when new innovations are presented to users, some factors influence their decision about how and when they will adopted it, especially perceived usefulness and perceived ease of use (Figure 4). Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320). Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort" (p. 320).

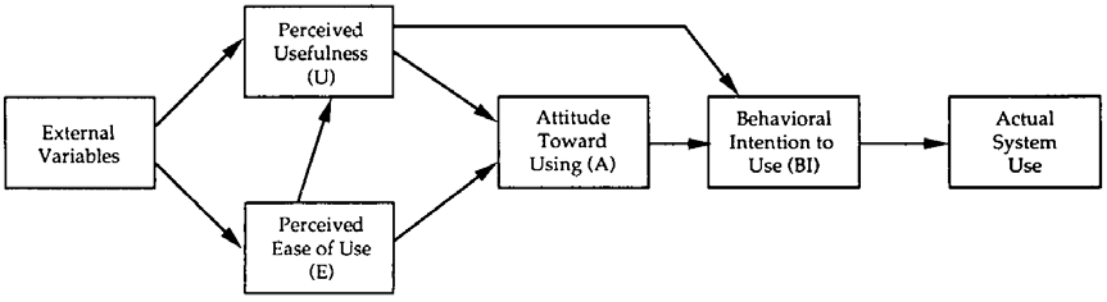


Figure 4. Davis's *technology acceptance model.*

CHAPTER 3

METHODOLOGY

Purpose of the Study

1. Identify the demographic characteristics of Internet adopters and non-adopters among faculty members in IMSU.

2. Determine if significant differences exist in demographic characteristics among Internet adopters and non-adopters.

3. Understand faculty members' perceptions of Internet that affect their decisions to adopt or reject the Internet.

4. Discover how university administration decisions impact faulty members' desires to adopt the Internet.

5. Determine the major factors motivating faculty members to adopt the Internet.

6. Identify the most common obstacles influencing faculty members' decisions to use the Internet in their research and academic activities.

7. Understand whether innovation characteristics (relative advantage, compatibility, results demonstrability, ease of use, image, visibility, and voluntariness) as perceived by faculty members predict their Internet adoption.

Participants

Education in Saudi Arabia is segregated by gender, resulting in two IMSU Campuses one for males and one for females. The population of this study consisted of full-time faculty members from both the male and female campuses of IMSU in Riyadh. This included all faculty members who had PhD degrees. Lecturers with master's degrees, teaching assistants, teachers with bachelor's degrees, and staff were excluded.

No sample was drawn from the study population. In order to have more accurate and comprehensive results for the study, the participants included all faculty members falling under the scope mentioned above. According to the 30th statistical book of the university, the university has eight colleges and one institute with 1097 faculty members with PhD (Table 2). This statistical information includes all faculty members who were ranked in the university system under this title regardless of their actual occupations. This means that faculty members who had administrative responsibilities without teaching or giving lectures were incorporated in the study population.

Table 2

Distribution of Number of Faculty Members by School

College	Number of PhD Faculty
College of Arabic Language	135
College of Islamic Law	173
College of Mass Communication	71
College of Social Science	207
College of Aqidah	186
College of Languages and Translation	61
College of computer Science and Information	27
College of Females	193
Institution of judgment	44
Total	1097

The purpose of this study is to examine faculty members' Internet adoption for academic and research purposes including teaching and academic research. Hence, those faculty members

holding administrative responsibilities without teaching were excluded. Unfortunately, I could not find any source that specifies the number of faculty members whose actual jobs were teaching. To cope with this problem, the secretary or the president of each department was asked in person about the teaching responsibilities of PhD faculty members in their department. Seven-hundred fifty faculty members were counted during this process, which was considered the population of the study.

Out of 750 questionnaires distributed, 351 questionnaires were returned. Among that number, 344 questionnaires, representing approximately 64% of the total were returned completed.

Instrumentation

The instrument used in this study was based on a general purpose instrument created by Moore and Benbasat (1991) who developed scales to measures individual's perceptions regarding the use of a technological innovation. Although their study focused on personal work stations, Moore and Benbasat developed scales that are generally applicable to a wide variety of diffusion of innovations studies, especially other types of information technologies. Moore and Benbasat stated that most existing instruments designed to test these characteristics lacked reliability and validity, and thus they created their own instruments which is appropriate to measure new innovations in terms of reliability, validity, and comprehension.

Moore and Benbasat's (1991) instrument was appropriate for the present study because the instrument aims to address perceived attributes of an innovation, not the characteristics of the innovation itself. Because each new innovation has its own features that are different from other innovations, the characteristics of the new innovation might need independent scales to measure the innovation’s diffusion among people. In the case of perception, people’s insights toward new objects are usually similar regardless of the type of the innovation. One feature of Moore and

Benbasate's instrument measures the perception of characteristics of innovation constructs, which has been applied to different types innovations such as solar energy (Labay & Kinnear, 1981), videotext technology (Bolton, 1981), and microcomputers (Hurt & Hubbard, 1987).

Moore and Benbasat's(1991)instruments is compatible to studying Internet diffusion due to common characteristics between personal work station technology and the Internet. PWS, for example, is a closed system that can function within its own network contents. The Internet, likewise, can be considered a closed system, a self-contained reality defined by rigid boundaries, which are comprised of networked services and hard drives (Taflove, 2001). Nunes (1995) stated that information on the Internet exists in a closed system, and nothing exists beyond its search parameters. In this particular study, the Internet has more user restrictions due to the filtering system created in Saudi Arabia.

Description of Moore and Benbasat Instrument

Moore and Benbasat (1991) developed their instrument to measure users' perception of adopting an information technology innovation and to be a tool for studying the initial adoption and eventual diffusion of any new innovation within organizations. The instrument was based on Rogers (2003) five attributes of an innovation: relative advantage, compatibility, complexity (renamed ease of use), observability, and trialability.

Based on reviewing related literature, two more constructs were identified to be important in the decision to adopt new technologies. The first construct, image, is defined by Moore and Benbasat (1991) as "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (p. 195). The second construct, voluntariness,is defined as "the degree to which use of innovation is perceived as being voluntary, or of free will" (p. 195).

During scale development, Moore and Benbasat (1991) found the observability construct quite complex, so they divided the construct into a result demonstrability construct and a visibility construct. Result demonstrability is the tangibility of the results of using the innovation, including observability and communicability. Visibility is the degree to which others can see that an innovation is being used (Benham & Raymond, 1996). The original constructs with the modifications are shown in Table 3.

Table 3

Rogers' Model and Moore and Benbasat's Modification

Rogers' Model	Moore and Benbasat Modifications
1. Relative advantage	1. Relative advantage
	2. Image (Rogers included image as an aspect of relative advantage)
2. Compatibility	3. Compatibility
3. Complexity	4. Ease of use (It was adopted from Davis' model because of the similarity in the their concepts)
4. Trialability	5. Trialability
5. Observability	6. Visibility (Observability was split to visibility and result demonstrability)
	7. Result demonstrability
	8. Voluntariness

Note: source: Al-Fulih, 2002.

Unlike other diffusion research findings, Moore and Benbasat (1991) argued that innovations diffuse because of the potential adopter's perception of using the innovation, not the adopter's perception of the innovation itself. Therefore, they reworded all definitions of

perceived characteristics to be related to the use of the innovation. For example, relative advantage was redefined as “the degree to which using the innovation is perceived as being better than using its precursor” (p. 196).

Moore and Benbasat (1991) developed the instrument in three stages. The first stage was items creation, whose purpose was to ensure content validity. During this stage, pools of items were created by reviewing the existing instruments and by creating additional items. The items then were re-evaluated to eliminate redundant or ambiguous items.

Scale development, the second stage aimed to assesses the construct validity of the scales being developed to identify vague items. The final process of this stage resulted in creating two sets of items grouped in two different sections in the questionnaire (Moore& Benbasat, 1991).

Instrument testing, the final stage of the development process, consists of two pilot tests and final field study. The initial test included 8 items applied to a sample of 20 users and nonusers. The purpose of this test is to evaluate the accuracy of the method used to compile the items and to initially assess the reliability of the scales (Moore & Benbasat, 1991).

Based on Cronbach’s (1951) Coefficient Alpha's Alpha standard, Moore and Benbasat (1991) shortened the questionnaire from 81 to 75 items, which was then distributed to 75 individuals for the second pilot test. The aim of this test was "to ensure that the various scales demonstrated the appropriate levels of reliability" (p. 205). Based on this second test, 32 items were eliminated from the instrument. The remaining 43 items was then distributed to 800 individuals in questionnaire form the final field test. Based on the analysis of the 43 items in the second field test, 5 additional items were eliminated, leaving 38 items for the final questionnaire (see Table 4).

Table 3

Reliability coefficients of the pilot tests and the field test

	PILOT TEST						FIELD TEST					
	FIRST (n=20)			SECOND (n=66)			SAMPLE #1 (n=270)			SAMPLE #2 (n=270)		
SCALE NAME	ITEMS	ALPHA	GLB	ITEMS	ALPHA	GLB	ITEMS	ALPHA	GLB	ITEMS	ALPHA	GLB
VOLUNTARINESS	5	0.93	0.96	4	0.87	0.88	4	0.82	0.83	4	0.87	0.86
MAGE	7	0.71	0.89	5	0.84	0.88	5	0.79	0.80	4	0.80	0.83
RELATIVE ADVANTAGE	14	0.89	0.98	9	0.90	0.91	9	0.95	0.95	8	0.92	0.93
COMPATIBILITY	11	0.52	0.86	4	0.81	0.82	4	0.88	0.88	4	0.83	0.84
EASE OF USE	10	0.79	0.91	8	0.83	0.85	8	0.81	0.81	6	0.80	0.80
TRIALABILITY	11	0.77	0.94	5	0.72	0.73	5	0.73	0.74	5	0.71	0.72
RESLUT DEMONSTRABILITY	8	0.20	0.64	4	0.72	0.74	4	0.81	0.81	3	0.77	0.78
VISIBILITY	9	0.83	0.96	4	0.37	0.46	5	0.72	0.75	4	0.73	0.81

Moore and Benbasat (1991) also created a short scales instrument by deleting 13 items that identified to have no significant negative effect on alpha or the content validity of the scales if they are deleted (Table 5).

Table 5

Alpha Coefficients of Short Scales

Construct	Items	Alpha
Relative advantage	5	0.90
Compatibility	3	0.86
Ease of use	4	0.84
Result demonstrability	4	0.79
Image	3	0.79
Visibility	2	0.83
Trialability	2	0.71
Voluntariness	2	0.82
Total number of items	25	

Research Instrument

This is an exploratory study that used a questionnaire (quantitative treatment) to collect data. Quantitative research is defined as "the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect," (Babbie, 2004).

Questionnaires are a vital tool to obtaining information from a large population in a short period of time. Sudman and Bradburn (1982) asserted that using one questionnaire can assist researchers in obtaining feedback on facts, figures, attitudes, opinions, experiences, and

judgment. The questionnaire of the present study (see appendix A) consisted of three sections. The first section included questions related to general perception of adopting the Internet for academic purposes. These perceptions were based on the five attributes of innovations derived by Rogers (2003) as well as three other characteristics developed by Moore and Benbasat (1991). A five-point Likert-type scale ranging from strongly agree to strongly disagree was applied to assess the perceived attributes of the Internet.

The second section of the questionnaire gathered demographic information regarding gender, age, academic rank, field of study, income level, and English language proficiency. The third section consisted of open-ended questions that gave participants the opportunity to express their comments and list the most common barriers against adopting the Internet in their academic environment. This section also allowed the participants the opportunity to express their opinions without being influenced by limited answers or given facts on the questionnaire (Foddy, 1994).

Translation of the Instrument

The original instrument developed by More and Banasat (1991) was slightly modified to fit the present study. For example, two items thought to be relevant to the adoption of Internet in the population were added. The first item, number 14, asked whether the Internet for personal needs (reading news, sports, and games) reduces the benefits of using the Internet for academic purposes. Item number 22 was also added to examine if English language proficiency is a barrier when using the Internet.

Content Validity

The instrument was tested through three stages. In the first stage, the writing center at he University of North Texas reviewed the modified English version to ensure the clarity of items and the accuracy of the language. Next, I translated the instrument into Arabic, the native language of the target population. In the last stage, a panel of experts was selected to establish

face and content validity of the instrument. The panel of experts consisted of five individuals (two faculty members and three PhD students) who were fluent in both the English and Arabic languages and who had experience in fields related to the instrument design and technology use. This panel was asked to review the modified version of the instrument and the translation and compare them with the original instrument.

This process was followed to ensure the validity, clarity, and accuracy of the translation as well as the consistency with the main purpose of this research. The final evaluation of the instrument was found to be satisfactory with minor changes. The feedback of the panel was used to make some modifications and clarifications prior to conducting the pilot study.

Reliability of the Instrument

Although the original instrument was tested for reliability and validity, it was significant to conduct a pilot study to measure the reliability of the translated version to ensure it was dependable and consistent. Reliability, also called consistency and reproducibility, is defined in general as the extent to which a measure, procedure, or instrument yields the same result on repeated trials (Carmines & Zeller, 1979). It can be used to assess the degree of consistence among multiple measurements of variables (Hair, Anderson, Tathman, & Black, 1998).

Another purpose of the pilot study was to ensure that respondents understood the translation of items and to decide if there was a need to revise any item. The pilot study results indicated that respondents understood the questionnaire and did not have difficulty with any item. As a result, no changes were made to the translated questionnaire.

For the reliability, was used as a measure of reliability (internal consistency). Using data obtained from the pilot study, Cronbach's (1951) alpha measured internal consistency of individuals' perceptions of voluntariness, relative advantage, compatibility, image, ease of use, result demonstrability, visibility, and trialability. Thirty subjects were selected from a population

similar to those who were surveyed in the main study. These subjects included faculty members of the Institute of Public Administration in Riyadh, Saudi Arabia. Since a reliability of .70 or higher is sufficient (Nunnally, 1978), the pilot test results showed construct alpha coefficients reached an acceptable level, ranging from 0.65 to 0.94 (see Table 6).

Table 6

Internal Consistency Reliability of the Construct

Construct	Items	Alpha
Voluntariness	2	.80
Relative advantage	7	.79
Compatibility	4	.75
Image	4	.94
Ease of use	5	.66
Result demonstrability	2	.65
Visibility	3	.79
Trialability	2	.79

Variables of the Study

The dependent variable was diffusion of Internet adoption among faculty members for academic purposes. Adoption is defined by Rogers (2003) as "the decision to make full use of an innovation as the best course of action available" (p. 21). This variable was measured by asking the participants to rate their frequency of Internet use for academic purposes.

The independent variables described the factors that influence adoption of the Internet. The variables derived from Moore and Benbasat (1991) included the following factors:

1. Relative advantage is the degree to which an innovation is considered a better than an alternative innovation. The greater the degree an individual perceives the advantages of an innovation to be, the more rapid the innovation's rate of adoption will be (Rogers, 2003).

2. Compatibility is the degree of the consistency of the innovation with the existing values, past experience, and needs for potential adopters. If an idea is inconsistent with the values of a society, it will not be adopted in the same rapidity as if it is compatible (Rogers, 2003).

3. Ease of use is defined as the degree to which an individual believes that using a particular system will be free of physical and mental effort (Davis, 1989).

4. Result demonstrability is the tangibility of the results of using the innovation, including their Observability and Communicability (Moore & Benbasat, 1991, p.203).

5. Visibility is the degree to which others can see that an innovation is being used (Benham & Raymond, 1996).

6. Trialability is the degree to which an innovation may be experimented with on a limited basis. The trial provides individuals with less uncertainly and gives them the opportunity to learn and practice by doing (Rogers, 2003).

7. Image is "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system." (Moore & Benbasat, 1991, p.195).

8. Voluntariness is "the degree to which use of innovation is perceived as being voluntary or of free will" (Moore & Benbasat, 1991, p.195).

Additional independent variables measured to assess the differences between Internet adopters and non-adopters were demographic characteristics. These variables included gender, age, academic rank, academic major, income, and English language proficiency (see Table 7).

Table 7

Variables with Their Corresponding Items in the Questionnaire

Variables	Items	Research question
Internet adoption	1	1
Demographic characteristics	31-35	2
university administration impact	1-2,27	3
Voluntariness	2-3	4
Relative advantage	4-10	5
Compatibility	11-14	6
Image	15-18	7
Ease of use	19-23	8
Result demonstrability	24-25	9
Visibility	26-28	10
Trialability	29-30	11

Data Collection

Collecting data for the study employed a questionnaire survey method. The questionnaires were distributed via two techniques. Because of the lack of a comprehensive list of email addresses for faulty members as well as uncertainty that all or most of them use email, the Arabic version of the questionnaire was distributed in paper copies to all participants. Therefore, the first step of data collection was contacting the Deanship of Scientific Research at IMSU to request permission to conduct the study with their faculty members. The deanship also served a central point to distribute and collect all copies of the questionnaire. Because I live in the United States, a main contact person in Saudi Arabia was assigned to be in charge of all the

necessary processes, communication, and followup with the deanship. This person was also continuously in contact with the presidents of academic departments and faculty members to encourage them to fill out the questionnaire and return it after completing all questions.

Data analysis

Statistical Package for the Social Sciences (SPSS 14.0) software was used for the statistical analysis of answers to the study questions. SPSS provides comprehensive statistical analyses for data ranging from basic to in-depth descriptive statistics.

The first question aimed to examine the extent of adopting the Internet by faculty members. Percentages were used to report answers for this question by analyzing item 1 in the questionnaire.

The second question examined whether there were significant differences in demographic characteristics among Internet adopters and non-adopters concerning gender, age, academic rank, field of study, income level, and English language proficiency. A chi-square test was applied to determine the statistical significance of answers to this question by analyzing items 1, 31, 32, 33, 34, and 35.

The third question examined the impact of the university administration on faulty members' desire to adopt the Internet. Answers to items 2, 3 and 27 of the questionnaire were analyzed using multiple regression analysis. Multiple regression was also used to analyze the answers of the remaining questions concerning the attributes of innovation as perceived by faculty members, which included voluntariness (items 2 and 3), relative advantage (items 4-10), compatibility (items 11-14), image (items 15-18), ease of use (items 19-23), result demonstrability (items 24-25), visibility (items 26-28), and trialability (items 29-30). In addition, Cronbach's alpha was calculated for each of the constructs in the instrument in order to assess their internal consistency reliability.

Multiple Regression Technique

Multiple regression is a statistical technique that allows researchers to use more than one independent variables to predict a single dependent variable. It can also show how a set of independent variables explains a proportion of the variance in a dependent variable at a significant level. Brace, Kemp, and Snelgar (2006) specify four conditions for using multiple regression technique in statistical analysis:

1. There are linear relationships between the predictor and dependent variables (i.e., the relationship follows a straight line).

2. The criterion variable is measured on a continuous scale such as interval or ratio scale.

3. The predictor variables are measured on a ratio, interval, or ordinal scale.

4. When there are a large number of observations. The number of participants must substantially exceed the number of predictor variables used in the regression. The absolute minimum is five times as many participants as predictor variables.

Similar to other statistical tests, multiple regression relies on some assumptions related to the variables used in the analysis. Study results may not be dependable when the assumptions are not met, so it is important to test these assumptions. In the present study three assumptions was tested: linearity, normality, and multicollinearity.

Linearity

Linearity in multiple regression is based on the assumption that there is a linear relationship between the independent variables and the dependent variables. If this is not the case, the predictions then could be skewed. While extensive violation of linearity means regression results may be more or less unusable, minor departures from linearity will not significantly affect the interpretation of regression output (Garson, 2007).

To detect whether the linearity assumption is met for this study, partial regression plots were used for each individual single predictor of Internet adoption, the dependent variable. This method also determined whether outliners data existed.

Normality

Multiple regression assumes that residuals will be normally distributed and of constant variance over the independent variables. Non-normally distributed variables (highly skewed or kurtotic variables, or variables with substantial outliers) can distort relationships and significance tests (Osborne & Waters, 2002). The normality assumption in this study was checked through a histogram of the residuals and the values of skewness and kurtosis.

Multicollinearity

Multicollinearity occurs when independent variables have strong correlations with each other. Therefore, multicollinearity causes wrong signs and magnitudes of regression coefficient estimates and a lack of statistical significance of individual independent variables. While the overall model may be strongly significant, incorrect conclusions are drawn about relationships between independent and dependent variables. (Fekedulegn, Colbert, Hicks, & Schuckers, 2002). Two tests in this study were employed to test multicollinearity including tolerance and the variance inflation factor (VIF).

CHAPTER 4

ANALYSIS AND RESULTS

Introduction

The purpose of the study was to examine factors leading to the decision to adopt the Internet in the academic environment as perceived by faculty members of Imam Mohammed Bin Saud University. The study attempted to report information that might be beneficial to improving the implementation of the Internet in the university.

This chapter reports the results of analyzing the data collected through the survey to answer the following questions:

1. To what extent do faculty members at IMSU adopt the Internet for academic purposes?
2. Are there any significant differences in demographic characteristics among Internet adopters and non-adopters in IMSU?
3. How does the university administration impact faulty members' desire to adopt the Internet?
4. Does the relative advantage attribute of innovation perceived by faculty members predict their Internet adoption?
5. Does the compatibility attribute of innovation perceived by faculty members predict their Internet adoption?
6. Does the results demonstrability attribute of innovation perceived by faculty members predict their Internet adoption?
7. Does the ease of use attribute of innovation perceived by faculty members predict their Internet adoption?
8. Does the image attribute of innovation perceived by faculty members predict their Internet adoption?

9. Does the visibility attribute of innovation perceived by faculty members predict their Internet adoption?

10. Does the voluntariness attribute of innovation perceived by faculty members predict their Internet adoption?

11. Does the trialability attribute of innovation perceived by faculty members predict their Internet adoption?

Demographic Description

Out of 750 questionnaires distributed to the faculty members of IMSU, 344 were returned for a response rate of 45.87%. The characteristics of faculty members were presented regarding the following demographic information: gender, age, academic rank, discipline, income, and English proficiency.

As Table 8 shows, the participants included more males (69.8%) than females (30.2%). The majority of the participants (46.5%) were between the ages of 30-39 years. The second highest group of participants (38.4%) fell in the age group of 40-49, followed by those whose age was between 50-59 (14%). Faculty members aged 60 years and older were the smallest group (1.2%). The participants were also asked to identify their academic ranks in the university. The analysis indicates that participants were primarily assistant professors (41.9%), followed by associate professors (33.1%) and professors (25%).

The distribution of academic discipline that most participants were majoring in consisted of social science (43.7%), followed by religion (23.3%). The percentage of those majoring in business and language was almost equal with 12.8% from language and 12.2% from business. Unsurprisingly, science faculty members were the smallest number among participants (8.1%) due to the current nature of the university‘s focus on social studies. Regarding monthly income, 41.9% reported receiving 11,000SR to 13,999SR, followed by the group whose monthly income

was 14,000SR or more (36%), then 8,000SR to 10,999SR (14.2%), and 5000SR to 7999SR (7.8%). The English language proficiency was reported to be at a good level among 33.7% of participants, a very good level among 25%, and an average level among 18.6%. The percentage of participants who did not speak any English was reported to be 7%.

Table 8

A Demographic Distribution of Participants

Variable	Frequency	Percentage
Gender		
Male	240	69.8
Female	104	30.2
Age		
30-39	160	46.5
40-49	132	38.4
50-59	48	14.0
60+	4	1.1
Academic rank		
Professor	86	25.0
Associate professor	114	33.1
Assistance professor	144	41.9
Discipline		
Social science	150	43.7
Religious	80	23.3
Language	44	12.8
Business	42	12.2
Science	28	8.1
Income		
5,000SR-7,999SR	27	7.9
8,000SR-10,999SR	49	14.2
11,000SR-13,999	144	41.9
14,000+	124	36.0
English proficiency		
None	24	7.0
Poor	54	15.7
Average	64	18.6
Good	116	33.7
Very good	86	25.0

Distribution of the Rate of Adoption

Q1. To what extent do faculty members at IMSU adopt the Internet for academic purposes?

The rate of adoption was determined by providing faculty members with five options to report their frequency of Internet use for academic and research purposes: I do not use it, rarely (once a month), sometimes (twice a month), often (once a week), and constantly (once or more a day). Among the 344 faculty members, the highest number (30%) related that they used the Internet for academic purposes twice a month, 29.1% of faculty members used it once a week, 16.3% used it once or more a day, 14% used it once a month, and 9.9% did not use the Internet at all (see Table 9).

Table 9

Distribution of the Rate of Internet Adoption

Rate	Frequency	Percent %	Cumulative percent %
None	34	9.9	9.9
Rarely	48	14	23.8
Sometimes	106	30.8	54.7
Often	100	29.1	83.7
Constantly	56	16.3	100

Demographic Differences Among Adopters and Non-adopters

Q2: Are there any significant demographic differences between adopters and non-adopters?

Differentiation between adopters and non-adopters was defined by asking faculty members whether or not they use the Internet for academic purposes. To answer the question,

participants were given the five-point Likert scale: no, rarely (once a month), sometimes (twice a month), often (once a week), and constantly (once or more a day). Those whose answers were no were considered to be non-adopters, whereas the remaining were grouped in the adopter category. Figure 6 shows the number of adopters versus non-adopters.

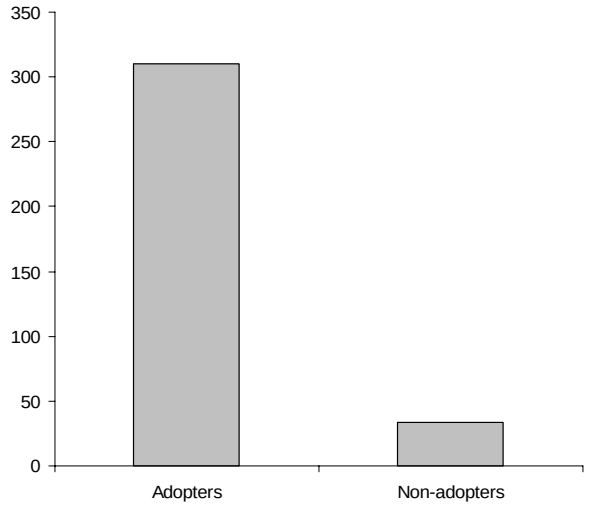


Figure 6. Total number of adopters and non-adopters.

Gender and Internet Adoption

The analysis indicated that out of 240 males, 220 (91.7%) were Internet adopters and 20 (8.3%) were not Internet adopters. From the total numbers of females, 90 (86.5%) faculty members were Internet adopters, while 14 (13.5%) were not (see Figure 7).

A chi-square test of independence was performed to examine the relationship between Internet adoption and gender. The relationship between these variables was not significant, χ^2 (1, N = 344) = 2.142, p = .143 > .05. This indicates that Internet adoption is independent of gender, i.e. there are no significant relationship between Internet adoption and gender (see Table 10).

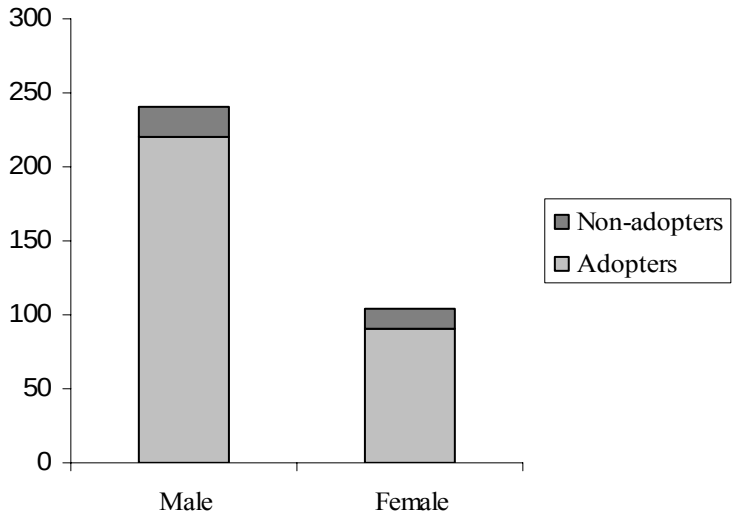


Figure 7. Adopters and non-adopters by gender.

Table 10

Relationship Between Gender and Internet Adoption

Internet		Male	Female	χ^2	*p*
Adopters	Total number	220	90		
	% within adoption	71	29		
	% within gender	91.7	86.5	2.142	.143
Non-adopters	Total number	20	14		
	% within adoption	58.8	41.2		
	% within gender	8.3	13.5		

Age and Internet Adoption

The age category was divided into four range groups. 148 (92.5%) participants in the 30-39 years age group were Internet adopters, while 12 (7.5%) participants were not Internet adopters. The age group of 40-49 years included 114 (86.4%) Internet adopters and 18 (13.6%) non-adopters. Out of 48 respondents representing the 50-59 age group, 44 (91.7%) were Internet

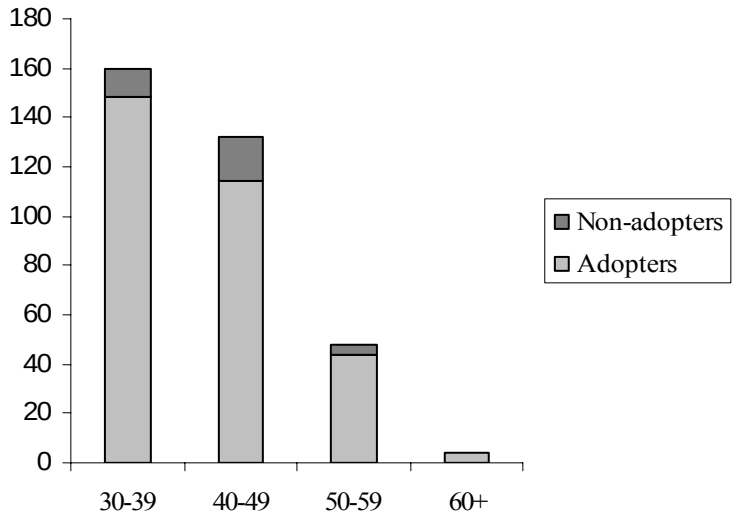


Figure 8. Adopters and non-adopters by age.

adopters and 4 (8.3%) were not. The smallest group in this category, whose age was 60+, contained only 4 faculty members, all of whom were Internet adopters (see Figure 8).

Table 11

Relationship Between Age and Internet Adoption

		Age Range					
Internet		30-39	40-49	50-59	60+	χ^2	*p*
Adopters	Total number	148	114	44	4		
	% within adoption	47.7	36.8	14.2	1.3		
	% within age	92.5	86.4	91.7	100	3.676	.299
Non-adopters	Total number	12	18	4	0		
	% within adoption	35.3	52.9	11.8	0		
	% within age	7.5%	13.6	8.3	0		

A chi-square test of independence was performed to examine the relationship between Internet adoption and age. The result of the examination showed that the relationship between

these variables was not significant, χ^2 (3, N = 344) = 3.676, p = .299 > .05. This indicates that Internet adoption is independent of age, i.e. there are no significant relationship exists between Internet adoption and age (see Table 11).

Academic Rank and Internet Adoption

The academic rank in this study included professors, associate professors, and assistant professors. Out of 144 assistant professors, 134 (93.1%) were Internet adopters, while only 10 (9%) were not. The total number of associate professors included 100 (87.7%) Internet adopters and 14 (12.3%) non-adopters. Professors represented the smallest group in this category totaling 86 faculty members. Out of this number, 76 (88.4%) professors were Internet adopters, and 10 (11.6%) were not adopters (see Figure 9).

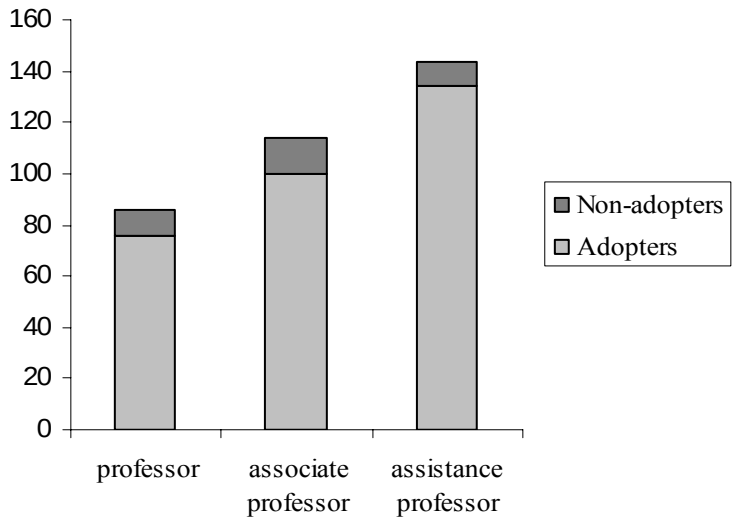


Figure 9. Adopters and non-adopters by academic rank.

A chi-square test of independence was performed to examine the relationship between Internet adoption and academic rank. The relationship between these variables was not significant, χ^2 (2, N = 344) = 2.426, p = .297 > .05, which indicates that Internet adoption is independent of academic rank, i.e. there is no significant relationship between Internet adoption and academic rank (see Table 12).

Table 12

Relationship Between Academic Rank and Internet Adoption

Internet		Professor	Associate Professor	Assistant Professor	χ^2	*p*
Adopters	Total number	76	100	134		
	% within adoption	24.5	32.3	43.2		
	% within the rank	88.4	87.7	93.1	2.426	.297
Non-adopters	Total number	10	114	10		
	% within adoption	29.4	41.2	29.4		
	% within gender	11.6	12.3	6.9		

Academic Discipline and Internet Adoption

As Figure 10 shows, five academic disciplines were included in this group: social science, religion, language, business, and science. The percentage of Internet adopters within each discipline was similar. Internet adoption among science faculty members (92.9%) was slightly higher than those from religious disciplines (92.5%). The percentages of the adoption in the other disciplines were language (90.9%), social science (89.3%), and business (85.7%).

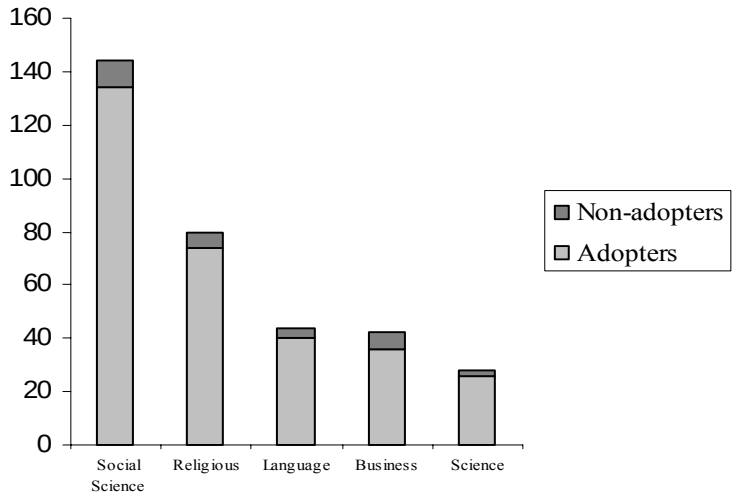


Figure 10. Adopters and non-adopters by academic discipline.

A chi-square test of independence was performed to examine the relationship between Internet adoption and academic discipline. The relationship between these variables was not significant, χ^2 (4, N = 344) = 2.426, p = .773 > .05, which indicates that Internet adoption is independent of academic discipline, i.e. there are no significant relationship between Internet adoption and academic discipline (see Table 13).

Table 13

Relationship Between Academic Discipline and Internet Adoption

	Social Science	Religion	Language	Business	Science	χ^2	*p*
Adopters							
Total number	134	74	40	36	26		
% within adoption	43.2	23.9	12.9	11.6	8.4		
% within discipline	89.3	92.5	90.9	85.7	92.9	1.795	.773
Non-adopters							
Total number	16	6	4	6	2		
% within adoption	47.1	17.6	11.8	17.6	5.9		
% within discipline	10.7	7.5	9.1	14.3	7.1		

Income Level and Internet Adoption

The income levels were grouped into four categories based on faculty monthly income by Riyal, the currency of Saudi Arabia ($1 = 3.75SR). The highest percentage of adopters was faculty members whose income equaled or exceeded 14,000SR (96.8%). Out of 49 faculty members whose salary range was 8,000SR-10,999SR, 45(91.8%) were Internet adopters. Of the 27 faculty members with an income level of 5,000SR-7,999SR, 23 (85.2%) were Internet

adopters. The lowest percentage of adopters (84.7%) was faculty members whose monthly income in the range of 11,000SR-13,999SR (See Figure 11).

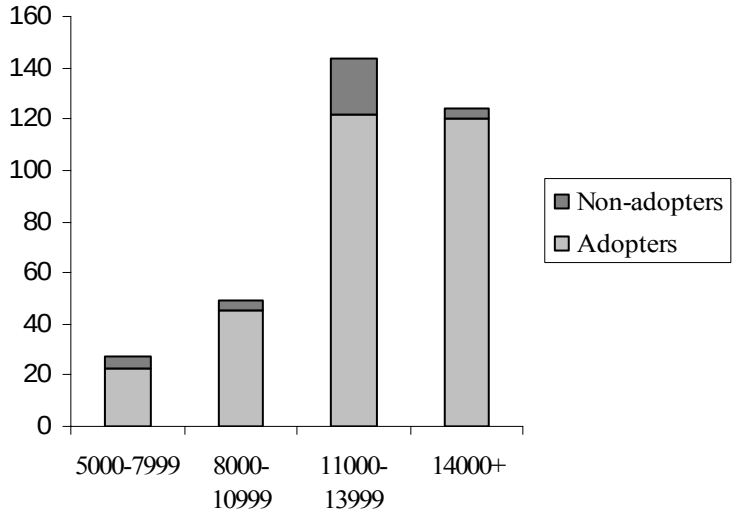


Figure 11. Adopters and non-adopters by income level.

Table 14

Relationship Between Income Level and Internet Adoption

	5,000SR to 7,999SR	8,000SR to 10,999SR	11,000SR to 13,999SR	14,000+ SR	χ^2	*p*
Adopters						
Total Number	4	4	22	120		
% within adoption	11.8	11.8	64.7	38.7	11.775	.008
% within income	14.8	8.2	15.3	96.8		
Non-adopters						
Total Number	23	45	122	4		
% within adoption	7.4	14.5	39.4	11.8		
% within income	85.2	91.8	84.7	3.2		

A chi-square test of independence was performed to examine the relationship between Internet adoption and income level. The relationship between these variables was not significant, χ^2 (3, N = 344) = 16.273, p = .008 < .05, which means that Internet adoption is independent of income level, i.e. there is no significant relationship between Internet adoption and income level (see Table 14).

English Proficiency and Internet Adoption

Five levels of skills were identified to measure faculty members' English proficiency: none, poor, average, good, and very good. Sixty-two faculty members (96.9%) whose English was average were Internet adopters and 2 (3.1%) were not Internet adopters. Fifty-two (96.3%) of faculty members with poor English skills were Internet adopters, while 2 (3.1%) were not Internet adopters. Seventy-eight (90.7%) faculty members with very good English skills were Internet adopters, while 8 (9.3%) were not Internet adopters. One-hundred two (87.9%) faculty members whose English skills were good were Internet adopters, while 14 (12.1%) were not Internet adopters (see Figure 12).

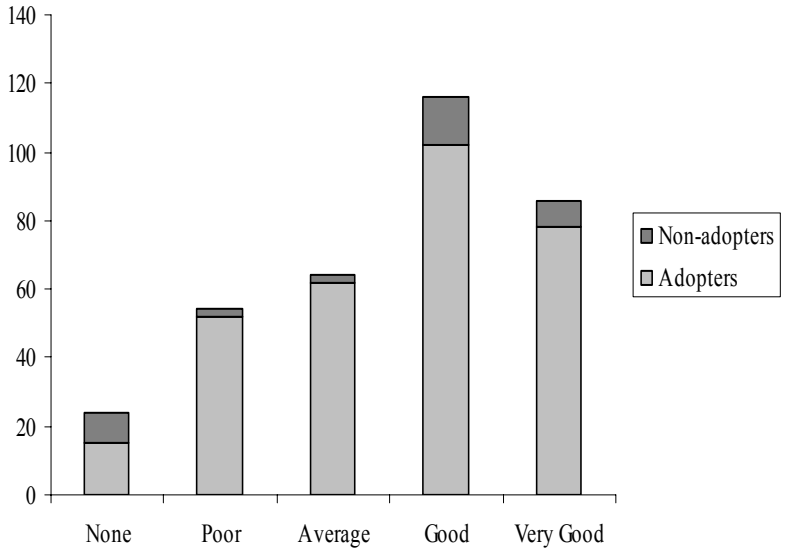


Figure 12. Adopters and non-adopters by English proficiency.

A chi-square test of independence was performed to examine the relationship between Internet adoption and English proficiency. The relationship between these variables was not significant, χ^2 (4, N = 344) = 21.069, p = .000 < .05 indicates that Internet adoption is independent of English proficiency, i.e. there is no significant relationship between Internet adoption and English proficiency (see Table 15).

Table 15

Relationship Between English Proficiency and Internet Adoption

Internet	None	Poor	Average	Good	Very good	χ^2	*p*
Adopters	16	52	62	102	78		
Total Number	5.2	16.8	20	32.9	25.2		
% within adoption	66.7	66.7	96.9	87.9	90.7	21.069	.000
% within proficiency					8		
Non-adopters	8	2	2	14	23.5		
Total Number	23.5	5.9	5.9	41.2	9.3		
% within adoption	33.3	3.7	3.1	12.1			
% within proficiency							

University's Administration's Impact on Faculty members

Q3. How does the university administration impact faulty members' desire to adopt the Internet?

To answer this question, composite scores for each faculty member were calculated with regard to the following statements on the questionnaire: Using the Internet is not required by the university (item 2), although it might be helpful; using the Internet is certainly not compulsory (item 3); and in my university, one sees the Internet connected to many computers (item 26).

To determine the impact of the university administration on faculty members' decisions to adopt the Internet, a multiple regression analysis was calculated using the items listed above as the independent variables with Internet adoption as the dependent variable. The multiple regression equation that answers this question takes the form of $y = b_1x_1 + b_2x_2 + b_3x_3 + c$.

The analysis showed that the university administration did have a statistically significant impact regarding Internet adoption among faculty members. As shown in Table 16, the predictors only shared 1.6% of the variance of the dependent variable. On the other hand, the *p* value for regression was not statistically significant at the .05 level, which means that university administration does not have much impact on faculty members' decision to adopt the Internet.

Table 16

Multiple Regression Analysis of University Impact on Internet Adoption

	Sum of Squares	*df*	Mean Square	*F*	*P*
Regression	7.768	3	2.589	1.859	.136
Residual	473.441	340	1.392		
Total	481.209	343			

Individual significance was identified among all predictors. The b value (see Table 17) indicates that CONNECTION was not significant at the 0.05 level. Therefore, this predictor will be excluded from the model in the next analysis.

The multiple regression equation for this model after excluding CONNECTION takes the form of y = b1 X1 + b2 x2 + c. When removing CONNECTION, the analysis showed no statistically significant effect of the university administration on faculty members' decision to adopt the Internet (see Table 18). Both predictors were statistically significant at the 0.05 level (see Table 19).

Table 17

Coefficient of University Administration Impact on the Decision of Internet Adoption

Predictors	B	Beta	P	Structure Coefficient
(Constant)	2.321		< .001	
REQUIREMENT	.140	.157	.026	.532[a]
COMPULSION	-.148	-.141	.047	-.305[a]
CONNECTION	.006	.006	.919	.48

[a]Correlation is significant at the 0.01 level (2-tailed).

Table 18

Multiple Regression of University's Impact Without CONNECTION

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	7.753	2	3.877	2.792	.063	.016
Residual	473.456	341	1.388			
Total	481.209	343				

Table 19

Coefficient of University Impact on Internet Adoption Without CONNECTION

Predictors	B	Beta	*P*	Structure Coefficient
(Constant)	2.335		< .001	
REQUIREMENT	.141	.158	.025	.532[a]
COMPULSION	-.147	-.140	.046	-.305[a]

[a]Correlation is significant at the 0.01 level (2-tailed)

Multiple regression analysis was conducted after excluding COMPULSION from the model. In this step, a change occurred in the model showing statistically significant effect of the university administration on faculty members' decision to adopt the Internet on Internet at 0.05 (Table 20). Both predictors were not statistically significant at the 0.05 level (see Table 21).

Table 20

Multiple Regression of University Administration Impact Without COMPULSION

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	2.218	2	1.109	.790	.455	.005
Residual	478.991	341	1.405			
Total	481.209	343				

Table 21

Coefficient of University Impact on Internet Adoption Without COMPULSION

Predictors	B	Beta	*P*	Structure Coefficient
(Constant)	2.081		< .001	
REQUIREMENT	.016	.069	.212	.995[a]
CONNECTION	-.007	-.007	.904	.090

[a]Correlation is significant at the 0.01 level (2-tailed).

The last change in the model was preformed by excluding REQUIREMENT from the model. In this analysis, the model displayed overall insignificance with $p > 0.05$ (see Table 22). The individual significance indicated that the CONNECTION and COMPULSION predictors were not statistically significant at the 0.05 level (see Table 23).

Table 22

Multiple Regression of University Administration Impact Without REQUIREMENT

	Sum of Squares	*df*	Mean Square	*F*	*P*	R^2
Regression	.818	2	.409	.290	.748	.002
Residual	480.391	341	1.409			
Total	481.209	343				

Table 23

Coefficient of University Administrations' Impact on Internet Adoption Without REQUIREMENT

Predictors	B	Beta	*P*	Structure Coefficient
(Constant)	2.397		< .001	
COMPULSION	-.044	-.042	.451	-.939[a]
CONNECTION	.015	.015	.793	.147[a]

[a]Correlation is significant at the 0.01 level (2-tailed)

Faculty Members' Perception of Innovation Attributes

A multiple regression analysis was conducted to determine the relationship between Internet adoption and each one of the following attribute: voluntariness, relative advantage, compatibility, images, ease of use, result demonstrability, visibility, and trialability. The multiple regression model used each attribute as an independent variable and Internet adoption as the dependent variable. This technique provided comprehension of the most influential predictors of the decision to adopt the Internet as perceived by faculty members. For the purpose of the analysis, the items in the questionnaire were coded as shown in Table 24.

Table 24

Items Codes on the Instrument

Attributes	Item Number	Code
Voluntariness		
	Item 2	REQUIREMENT
	Item 3	COMPULSION
Relative Advantage		
	Item 4	ACCOMPLISH
	Item 5	QUALITY
	Item 6	EASE
	Item 7	BENEFIT
	Item 8	EFFICIENCY
	Item 9	CONTROL
	Item 10	PRODUCTIVITY
Compatibility		
	Item 11	COMP-WORK
	Item 12	COMP-RELIGIOUS
	Item 13	FITNESS
	Item 14	PERSONAL
Image		
	Item 15	IMPROVEMENT
	Item 16	PRESTIGE
	Item 17	PROFILE
	Item 18	SYMBOL
Ease of use		
	Item 19	MENTAL
	Item 20	FRUSTRATION
	Item 21	ACHIEVEMENT
	Item 22	ENGLISH
	Item 23	OPERATION
Result demonstrability		
	Item 24	RESULT
	Item 25	DIFFICULTY
Visibility		
	Item 26	CONNECTION
	Item 27	OUTSIDE
	Item 28	VISIBLE
Trialability		
	Item 29	TRIAL
	Item 30	SATISFACTION

Construct Validity

Construct validity refers to the degree to which a study, test, or manipulation measures and/or manipulates what the researcher claims it does (Mitchell & Jolley, 2001). Validity is established by the degree to which the measure confirms a network of related hypotheses generated from a theory based on concepts (Zikmund, 2003).

According to Mitchell and Jolley (2001), construct validity is important because it addresses a fundamental question: What does the measure really measure? Researchers should be careful when leaping from the public, observable, physical world of operational definition to the private, unobservable, mental world of constructs. Each item in an instrument must reflect the construct and must also show a correlation with other items in the instrument.

Principal components analysis was conducted with a Varimax rotation to assess construct validity. Comrey (1973) suggested that loadings in excess of 0.45 could be considered fair, those greater than 0.55 as good, those of 0.63 very good, and those of 0.71 as excellent. As the factor pattern shows in Table 18, loadings on the target factor are in the excellent range (10 out of 29), Fair (9 out of 29), very good (7 out of 29), and good (3 out of 29). As Table 25 shows, no weak loading was found indicating the validity of constructs applied in this study.

Table 25

Factor Analysis of Items Sorted by Construct

Item	F1	F2	F3	F4	F5	F6	F7	F8
Voluntariness (1)	-.106	-.013	.103	.087	.091	.824	.048	.161
Voluntariness (2)	-.056	-.063	-.020	-.047	.182	.856	-.032	.030
Relative advantage (1)	.732	.166	.178	.105	-.128	.089	.090	-.207
Relative advantage (2)	.815	.106	.200	.052	-.007	-.051	.137	-.031
Relative advantage (3)	.803	.145	.038	-.006	.044	.009	-.027	.071

(table continues)

Table 25 *(continued).*

Item	F1	F2	F3	F4	F5	F6	F7	F8
Relative advantage (4)	.707	.223	-.008	.047	-.052	-.162	-.061	.184
Relative advantage (5)	.544	.359	-.041	.272	-.188	-.027	-.069	.331
Relative advantage (6)	. 536	.302	.061	.167	.082	-.144	-.006	.342
Relative advantage (7)	. 519	.098	.118	.037	.047	-.122	-.102	.045
Compatibility (1)	.327	.614	.066	.068	.165	-.157	.142	.053
Compatibility (2)	.112	.685	.146	.082	.034	-.031	.025	.110
Compatibility (3)	.375	.587	.200	.058	-.110	-.047	-.097	.088
Compatibility (4)	.283	.483	.234	-.034	-.009	.311	-.090	-.280
Image (1)	.100	. 295	-.067	.664	.010	.168	.179	-.191
Image (2)	.023	.444	-.089	.695	.001	.114	.151	.052
Image (3)	.128	.231	.092	.862	-.015	-.037	.032	.113
Image (4)	.092	-.050	.032	.832	.159	-.008	.071	-.121
Ease of use (1)	.008	-.048	-.123	.217	.169	.005	.765	-.014
Ease of use (2)	-.103	.009	-.229	.135	. 015	.162	.452	.298
Ease of use (3)	.149	.090	.200	-.045	-.042	.253	. 761	.022
Ease of use (4)	-.091	.375	.411	.061	.332	-.052	.548	.258
Ease of use (5)	.063	.229	-.126	-.009	-.069	.135	.684	.067
Item	F1	F2	F3	F4	F5	F6	F7	F8
Result demonstrability (1)	.164	.137	.129	-.073	. 650	.007	-.055	.019
Result demonstrability (2)	-.032	.080	.154	.183	.841	.074	-.021	-.061
Visibility (1)	-.050	.058	.710	-.099	.170	.169	.117	-.062
Visibility (2)	.275	-.109	.493	.047	.267	.156	-.112	.131

(table continues)

Table 25 *(continued).*

Item	F1	F2	F3	F4	F5	F6	F7	F8
Visibility (3)	.022	-.238	.505	.192	.307	-.046	.117	-.011
Trialability (1)	.054	.204	.404	-.122	-.071	-.019	-.017	.594
Trialability (2)	.113	.193	.375	.097	.031	-.075	.036	.502

Reliability of the Constructs

A reliability test was performed using data obtained from the pilot study to test the reliability and internal consistency of the faculty members' individual perceptions of each construct in the instrument. The alpha values from the data obtained from the pilot study ranged from .65 to .95. Table 26 shows the alpha values for the study ranged from .73 to .96 with overall alpha value of .83. The result indicated that all constructs of the model were reliable. Therefore, the internal consistency of the instrument was acceptable.

Table 26

Cronbach's Alpha Reliability of Constructs in the Study

Construct	Items	Alpha
Voluntariness	2	.82
Relative advantage	7	.86
Compatibility	4	.81
Image	4	.96
Ease of use	5	.76
Result demonstrability	2	.83
Visibility	3	.73
Trialability	2	.93

Assumption of Linearity

Linearity means there is a straight line relationship between the independent variables and the dependent variables. This linearity of the relationship represents the degree to which the changes in the dependent variables are associated with the independent variables (Hair, Black, Babin, Anderson & Tatham, 2006).

The assumptions of linearity were investigated utilizing partial regression plots for each individual single predictor of Internet adoption (the dependent variable) while controlling the effect of other predictors to analyze the data (see Appendix E). Visual examination of the scatterplots for all predictor variables showed that the points were symmetrically distributed around a diagonal line revealing no evidence of nonlinearity. Based on this examination, the linearity assumption was met, and there were no violations of these assumptions.

Assumption of Normality

Regression assumes that variables have normal distributions. To test this assumption, a histogram for the residuals and dependent variable was constructed including a line that illustrated what the shape would look like if the distribution were accurately normal. The distribution of the data was approximately symmetric and bell shaped. No outliners were identified through visual inspection of the histogram, which indicated the normality assumption was not violated (see Figure 13).

In addition, the values of skewness and kurtosis were obtained to confirm the result if the histogram. Skewness of data measures a shift from the center toward either side. Kurtosis identifies the shape of the distribution curve to be taller or flatter. The value of both measurements is shown in Table 27.

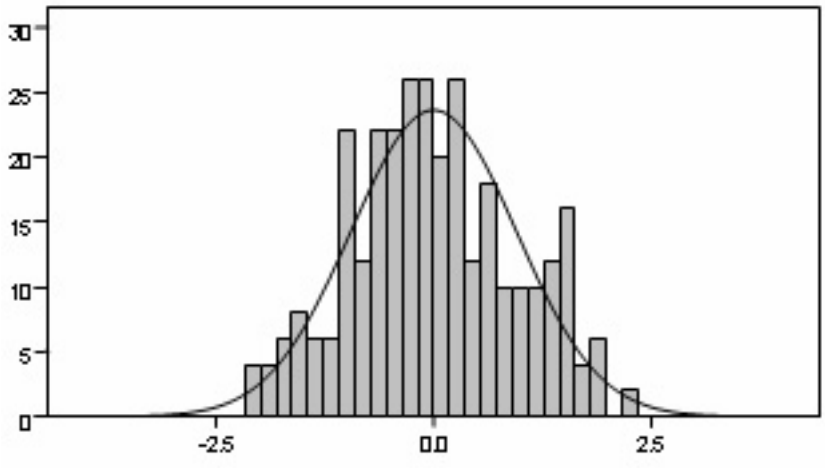


Figure 13. Distribution of Internet adoption.

Table 27

Skewness and Kurtosis of Data Distribution

Variable	Mean	Median	Standard deviation	Skewness	Kurtosis
Adoption	2.28	2.00	1.184	-.322	-.668

Multicollinearity

Another assumption of multiple regression is multicollinearity, which is the occurrence of high correlations between predictor variables in a multiple regression. When multicollineary presents, it is difficult to determine a reliable estimation of the individual regression coefficients because the correlated variables basically measure the same phenomenon or construct (Nurminen, 2004).

Two tests for multicollinearity were applied including tolerance and variance inflation factor (VIF). If tolerance is less than .20, a problem with multicollinearity is indicated. Likewise, VIH with a value greater than 4 implies an arbitrary, yet cut-off criterion for deciding when a given independent variable displays high multicollinearity (Garson, 2007). As Table 28 displays,

the results of these examinations revealed all independent variables had acceptable tolerance and VIF scores. Multicollinearity was not a problem.

Table 28

Collinearity Diagnostics of Tolerance and VIF

Predictors	Tolerance	VIF
REQUIREMENT	.488	2.047
COMPULSION	.469	2.133
ACCOMPLISH	.461	2.168
QUALITY	.372	2.691
EASE	.448	2.232
BENEFIT	.470	2.126
EFFICIENCY	.455	2.196
CONTROL	.421	2.374
PRODUCTIVITY	.449	2.226
COMP-WORK	.488	2.048
COMP-RELIGIOUS	.543	1.841
FITNESS	.481	2.078
PERSONAL	.614	1.628
IMPROVEMENT	.461	2.169
PRESTIGE	.334	2.998
PROFILE	.303	3.305
SYMBOL	.427	2.340
MENTAL	.506	1.977

(table continues)

Table 28 *(continued).*

Predictors	Tolerance	VIF
FRUSTRATION	.468	2.136
ACHIEVEMENT	.694	1.440
ENGLISH	.675	1.482
OPERATION	.571	1.751
RESULT	.570	1.753
DIFFICULTY	.465	2.149
CONNECTION	.543	1.842
OUTSIDE	.694	1.441
VISIBLE	.672	1.489
TRIAL	.513	1.949
SATISFACTION	.370	2.702

Attributes of Innovation as Perceived by Faculty Members

Before analyzing each predictor variable individually, a multiple regression analysis was applied to the entire model of innovation attributes to account for the variance in the dependent variable, Internet adoption. The multiple regression equation for this model took the form of $y = c + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8$ where:

y was the expected value of Internet adoption,

c was the constant,

b_n was the estimated slope (beta coefficient) for the eight predictors,

x_1 was the value of voluntariness variable,

x_2 was the value of relative advantage variable,

x_3 was the value of compatiblity variable,

x_4 was the value of image variable,

x_5 was the value of ease of use variable,

x_6 was the value of result demonstrability variable,

x_7 was the value of visibility variable, and

x_8 was the value of trialability variable

As shown in Table 29, the analysis of the combined variables indicated the entire model was statistically significant in predicting Internet adoption at the level of .05. The R square value for the model was .332, which means that 33.2% of the variance in Internet adoption by faculty members was explained by the eight predictors together.

Table 29

Regression Analysis of the Eight Attributes Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*P*	R^2
Regression	94.597	29	3.262	4.791	< .001	.332
Residual	190.642	280	.681			
Total	285.239	309				

Question 4

Does voluntariness attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation to answer this question is $y = c + b_1x_1 + b_2x_2$. The results of multiple regression analysis indicated a significant statistical relationship between Internet adoption and the independent variable of voluntariness. As Table 30 shows, voluntariness explains 3% of variance in predicting the adoption of Internet by faculty members.

The *p* value = .009 < .05, meaning that the voluntariness is a statistically significant predictor of the dependent variable adoption.

Both variables of voluntariness were significant predictors at the .05 level. The b weight for compulsion variable was .192. This means that if this variable increases one unit, Internet adoption will increase .192 when holding the other variable constant. The b weight for REQUIREMENT variable was -.134, which means that if this variable increases one unit, Internet adoption will decrease .134 when holding the other variable constant (Table 31).

Table 30

Voluntariness Attribute Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	8.535	2	4.268	4.735	.009	.030
Residual	276.704	307	.901			
Total	285.239	309				

Table 31

Coefficients of Voluntariness Attribute Perceived by Faculty Members

Predictors	B	Beta	*p*	Structure Coefficient
(Constant)	2.435		< .001	
REQUIREMENT	-.134	-.181	.014	-.231[a]
compulsion	.192	.219	.003	.598[a]

[a]Correlation is significant at the 0.01 level (2-tailed)

Question 5

Does relative advantage attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation for this question takes the form of $y = c + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7$. Multiple regression analysis using relative advantage variable as the predictor was also conducted. The analysis indicated that relative advantage is a statistically significant predictor for the Internet adoption at the .05 level (see Table 32). The R square value in this model was .126, meaning that 12.6% of the variance in predicting Internet adoption is explained by relative advantage. Therefore, faculty members who perceived the Internet as more advantageous were more likely to adopt the Internet.

Table 32

Relative Advantage Attribute Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	36.066	7	5.152	6.245	< .001	.126
Residual	249.172	302	.825			
Total	285.239	309				

Among the seven variables, ACCOMPLISHMENT and EFFICIENCY variables were the best predictors respectively. The b weight for ACCOMPLISHMENT was .362, which means that as this variable increases one unit, Internet adoption will increase to .362 when holding the other six variables constant in this model. The b weight for EFFICIENCY was .313 meaning that Internet adoption will increase .313 when this variable increases one unit. The PRODUCTIVITY variable was also a statistically significant predictor with a b weight of .138.

The structure coefficient for ACCOMPLISHMENT was .736, while it was .774 for EFFICIENCY and .472 for PRODUCTIVITY (see Table 33). The other predictors in relative advantage variable were not statistically significant at the .05 level.

Table 33

Coefficients of Relative Advantage Attribute Perceived by Faculty Members

Predictors	B	Beta	*P*	Structure Coefficient
(Constant)	.628		.181	
ACCOMPLISHMENT	.362	.247	< .001	.736[a]
IMPROVEMENT	-.156	-.095	.206	.362[a]
EASIER	-.045	-.030	.672	.317[a]
BENEFICIAL	-.030	-.021	.761	.339[a]
EFFICIENCY	.313	.262	< .001	.774[a]
CONTROL	-.126	-.098	.234	.234[a]
PRODUCTIVITY	.138	.096	.472	.472[a]

[a]Correlation is significant at the 0.01 level (2-tailed).

Question 6

Does compatibility attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation that answers this question takes the form of $y = c + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4$. Multiple regression analysis showed that the independent variable of compatibility has a statistically significant relationship with the dependent variable at the .05 level as shown in Table 34. The R square value in the model

was .135. This indicates that the compatibility variable explained only 13.5% of the variance in Internet adoption.

Table 34

Compatibility Attribute Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	38.501	4	9.625	11.898	< .001	.135
Residual	246.738	305	.809			
Total	285.239	309				

As shown in Table 35, all the variables except for FITNESS in the compatibility attribute were statistically significant predictors.

Table 35

Coefficients for Compatibility Attribute Perceived by Faculty Members

Predictors	B	Beta	*p*	Structure Coefficient
(Constant)	.228		.507	
COMP-WORK	.193	.178	.004	.782[a]
COMP-RELIGIOUS	.152	.131	.046	.759[a]
FITNESS	.122	.100	.115	.686[a]
PERSONAL	.120	.114	.046	.534[a]

[a] Correlation is significant at the 0.01 level (2-tailed).

The COMP-WORK variable was a slightly better predictor among the other variables with a b weight of .193. This means that Internet adoption will increase by .193 when this variable increases one unit while holding other predictors constant. The b weight for COMP-

RELIGIOUS was .152, meaning that Internet adoption will increase by .152 when this variable increases one unit. The b weight for the PERSONAL variable was .120, meaning that Internet adoption will increase by .120 when this variable increases one unit. The FITNESS variable was not statistically significant at the .05 level.

Question 7

Does image attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation for this question takes the form of

$y = c + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4$. Multiple regression analysis of composite scores of image showed this variable as a significant statistical predictor for Internet adoption at the .05 level. The R square value for image was .089, which means that 8.9% of the variance in predicting Internet adoption is explained by the image variable (see Table 36). Consequently, faculty members who perceived the Internet as a factor to enhance their status in the university were more likely to adopt the Internet.

Table 36

Image Attribute Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	25.417	4	6.354	7.459	< .001	.089
Residual	259.822	305	.852			
Total	285.239	309				

Among the four variables of image, the PROFILE variable was the best predictor, followed by the IMPROVEMENT variable. The b weight for PROFILE was .343, meaning that as this variable increases one unit, Internet adoption will increase .343 when holding the other

three variables constant in the model. The b weight for IMPROVEMENT was .129, which means as this variable increases one unit, Internet adoption will increase .129 when holding the other variables constant. As it is shown in Table 37, the structure coefficient for PROFILE was .901 and it was .509 for IMPROVEMENT. The other two predictors in the model were not statistically significant at the .05 level.

Table 37

Coefficients for Image Attribute Perceived by Faculty Members

	B	Beta	*p*	Structure Coefficient
(Constant)	1.681		< .001	
IMPROVEMENT	.129	.130	.060	.506[a]
PRESTIGE	-.134	-.138	.109	.498[a]
PROFILE	.343	.375	< .001	.901[a]
SYMBOL	-.082	-.088	.225	.413[a]

[a] Correlation is significant at the 0.01 level (2-tailed)

Question 8

Does ease of use attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation needed to answer this question takes the for of $y = c + b1x1 + b2x2 + b3x3 + b4x4 + b5x5$. The analysis of composite scores in this model indicated that ease of use is a significant statistical predictor of Internet adoption among faculty members at the .05 level. The R square value was .084, as shown in Table 38. This shows that ease of use explained only

8.4% of the variance in Internet adoption, which can be an indicator that faculty members who believed that using the Internet is free of difficulty leave as is more likely to adopt it.

Table 38

Ease of Use Attribute Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	23.854	5	4.771	5.549	< .001	.084
Residual	261.384	304	.860			
Total	285.239	309				

Table 39 shows that among the five variables of ease of use, the OPERATION variable was the best predictor of Internet adoption. The b weight for this variable was .293, meaning that as the variable increases one unit, Internet adoption will increase .293 when holding the other four variables constant. The structure coefficient for ease of use was .850. The ACHIEVEMENT and ENGLISH predictors in ease of use variable were not statistically significant at the .05 level.

Table 39

Coefficients for Ease of Use Attribute Perceived by Faculty

	B	Beta	*p*	Structure Coefficient
(Constant)	.803		.044	
MENTAL	.064	.069	.287	.493 [a]
FRUSRATION	.083	.098	.139	.485[a]
ACHIEVEMENT	-.029	-.028	.628	.058
ENGLISH	.045	.054	.366	.354 [a]
OPERATION	.293	.224	< .001	.850 [a]

[a] Correlation is significant at the 0.01 level (2-tailed).

Question 9

Does results demonstrability attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation for this question takes the form of y =c + b1 x1 + b2 x2. As shown in Table 40, multiple regression analysis revealed a significant correlation between result demonstrability and faculty members' Internet adoption at the .05 level. The R square value for this variable was .073, meaning that 7.3% of the variance in Internet adoption is explained by this variable.

Table 40

Result Demonstrability Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	20.888	2	10.444	7.459	< .001	.073
Residual	264.351	307	.861			
Total	285.239	309				

The two variables in the result demonstrability attribute were found to be good predictors of Internet adoption. However, the RESULT variable had a stronger influence. As shown in Table 41, the b weight for the RESULT variable was .323, meaning that as this variable increases one unit, Internet adoption will increase by .323 when holding the other variable in the model constant. The b weight for the DIFFICULTY variable was .164, meaning that as this variable increases one unit, Internet adoption will increase .164 when holding RESULT variable constant. The structure coefficient for RESULT was .744, while it was .423 for DIFFICULTY.

Table 41

Coefficients for Result Demonstrability Perceived by Faculty

	B	Beta	*p*	Structure coefficient
(Constant)	.793		.027	
RESULT	.323	.256	< .001	.744[a]
DIFFICULTY	.164	.189	.001	.423[a]

[a] Correlation is significant at the 0.01 level (2-tailed).

Question 10

Does visibility attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation for predicting visibility can be expressed as follows y = c + b1 x1 + b2 x2 + b3 x3. Table 42 indicates that visibility is a statistically significant predictor for faculty members' Internet adoption ($p = .006 < .05$). Although statistically significant, the R square value suggests that only 4% of variance in predicting Internet adoption is explained by this factor. The frequency to which faculty members saw the Internet as accessible inside or outside the university influenced their Internet adoption can be inferred from this result.

Table 42

Visibility Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	11.480	3	3.827	7.459	.006	.040
Residual	273.759	306	.895			
Total	285.239	309				

Table 43 shows that only the CONNECTION variable was not a statistically significant predictor at the .05 level in this model. The other two variables, OUTSIDE and VISIBLE, appeared to influence Internet adoption. The b weight for OUTSIDE was .174, which means that as this variable increases one unit. Internet adoption will increase by .174 when holding the other two variables constant. The value for VISIBLE was .144, which means that as this variable increases one unit, Internet adoption will increase by .144 when holding the other two variables constant.

Table 43

Coefficients for Visibility Perceived by Faculty Members

	B	Beta	*P*	Structure coefficient
(Constant)	1.564		< .001	
CONNECTION	-.021	-.026	.652	-.097
OUTSIDE	.174	.159	.007	.581[a]
VISIBLE	.144	.051	.005	.647[a]

[a] Correlation is significant at the 0.01 level (2-tailed)

Question 11

Does trialability attribute of innovation perceived by faculty members predict their Internet adoption?

The multiple regression equation needed to predict the influence of trialability takes the form y = c + b1 x1 + b2 x2. Similar to other variables in the model, Table 44 shows trialability is a statistically significant predictor of Internet adoption ($p = .006 < .05$). The R square value was equal to that of visibility ($R^2 = .040$). This means that the trialability variable explains 4% of variance of predicting Internet adoption.

Table 44

Trialability Perceived by Faculty Members

	Sum of Squares	*df*	Mean Square	*F*	*p*	R^2
Regression	11.296	2	5.648	6.330	.002	.040
Residual	273.942	307	.892			
Total	285.239	309				

The SATISFACTION variable was a predictor of Internet adoption in this model (b = .248). This indicates that Internet adoption will increase .248 when this factor increases one unit while holding the other factor constant. The TRIAL factor was not a statistically significant predictor at the .05 level (see Table 45).

Table 45

Coefficients of Trialability Perceived by Faculty Members

	B	Beta	*p*	Structure coefficient
(Constant)	2.046		< .001	
TRIAL	-.117	-.124	.086	.177[a]
SATISFACTION	.248	.253	.001	.875[a]

[a] Correlation is significant at the 0.01 level (2-tailed).

Open-ended Question Analysis

One open-ended question was included in the questionnaire to identify the most common barriers preventing faculty members from using the Internet for research and academic activities. While some responses confirmed some of the obstacles found in previous studies, other

responses pointed out new obstacles. Out of 344 faculty members included in this study, 60 (17%) members answered the open-ended question.

Quality of Internet connection

The low quality of Internet connection was reported as the most common barrier by 49 faculty members. This included slow speed and frequent disconnection during browsing. One respondent stated that "the recurrent disconnection makes me discourage my students to use the Internet for course assignments." Another respondent complained that "the Internet is supposed to reduce the time spent to find information, yet with continuous interruption, I sometimes find it easier to use the library to meet my information needs."

English proficiency

Faculty members who reported the English language as a major barrier to using the Internet confirmed the results found in the demographic analysis of this study. The demographic analysis shows that 70% of the participants were at or below the average level in English proficiency. This common barrier might be due to the rareness of academic and scholarly Arabic Web sites. Two faculty members stated they had problems with a lack of adequate Arabic search engines to locate needed information, especially classified and specialized resources. Some popular search engines, such as Google, provide Arabic translation for retrieved Web sites, which might solve part of this problem. However, one respondent said, “The need of translation software built cooperatively with Arabic specialists in each discipline arises today, especially with the inaccuracy of the translation of foreign search engines."

Filtering system

All incoming Web traffic to Saudi Arabia passes through a proxy system to filter forbidden Internet content. Blocked Web sites include those that contain content in violation of Islamic tradition and national regulations as well as pornographic sites. Faculty members

complained that inaccuracy of a filtering system resulted in overblocking of unrelated contents. In fact, one faculty member asserted, "Even some academic and research sites are blocked…. I do not request to unblock those sites because it wastes my time to do so."

Internet access points

The availability of Internet access throughout the university was addressed as another common barrier to the diffusion of the Internet. Forty-five faculty members reported a lack of enough access points in the university.

The female campus was not connected to the Internet. One female faculty member said, "The Internet is not provided for our campus even in faculty offices." Another female faculty member commented, "By not connecting our campus to the Internet, the university seems to not encourage faculty use of the Internet."

Although Internet access in the male campus was much better, some responses indicated that not each faculty member had access to the Internet. "I am not provided with Internet access in my office, so I have to go to the library sometimes to browse the Internet," one faculty member stated.

The lack of Internet in the classrooms was also mentioned as a barrier to adopting the Internet for instructional and research purposes for both faculty members and students. As one faculty member complained, "Students need to be taken to the computer lab if the instructor wants to show them Web sites related to their assignment."

Cost of the Internet

The cost of Internet access has been an issue since the service was implemented in Saudi Arabia. Some faculty members reported the cost as one of the barriers to Internet diffusion among faculty members. One faculty member said "I decided to switch to DSL connection because of the bad connection of dial-up, but I found it unaffordable to pay for DSL."

The expensive cost of the Internet is not only a barrier because of the connection expenses, but also because of funds needed to purchase resources available through the Internet. One said, "Most academic databases in my field are not free on the Internet, and the library does not subscribe to them." Cost as a barrier to adopting the Internet in Saudi Arabia is not a new issue. (Al-Fulih, 2002; Al-Kahbra, 2003).

Resistance of technology

One of the listed issues against diffusion of the Internet was the university administration's awareness of the importance of the Internet in teaching and learning. "The university is still unaware of the valuable information on the Internet, which resulted in not providing the classrooms with computers and Internet," one faculty member said. The lack of knowledge about the valuable resources on the Internet also includes some faculty members who still have negative views toward electronic resources. As one faculty member said, "Some professors ask students to obtain information from books, not from the Internet or even other electronic resources."

Faculty Comments and Suggestions

The last item in the questionnaire asked faculty members to include any comments they wanted to address. Most of the comments were suggestions to improve Internet services and implementation in the university. These comments can be summarized as follows:

1. Utilize electronic learning systems in teaching such as WebCT.
2. Market electronic databases to faculty members.
3. Hold workshops on Internet and databases information-seeking skills.
4. Increase Internet connection speed.
5. Establish enough computer labs.
6. Provide faculty members with training in the use of the Internet.

CHAPTER 5

SUMMARY AND DISCUSSION

Introduction

The purpose of this study was to use the attributes of an innovation in Rogers' (2003) diffusion of innovations theory to identify predictors of Internet adoption by faculty members of Imam Mohamed Bin Saud Islamic University (IMSU) in Riyadh, Saudi Arabia. The study employed Moore and Benbasat's (1991) modification of Rogers' attributes, which included eight attributes: voluntariness, relative advantage, compatibility, image, ease of use, result demonstrability, visibility, and trialability.

The population of this study included faculty members who teach courses on the main campus of IMSU. The study attempted to answer the following questions:

1. To what extent do faculty members at IMSU adopt the Internet for academic purposes?

2. Are there any significant differences in demographic characteristics among Internet adopters and non-adopters in IMSU?

3. How does the university administration impact faulty members' desire to adopt the Internet?

4. Does the relative advantage attribute of innovation perceived by faculty members predict their Internet adoption?

5. Does the compatibility attribute of innovation perceived by faculty members predict their Internet adoption?

6. Does the results demonstrability attribute of innovation perceived by faculty members predict their Internet adoption?

7. Does the ease of use attribute of innovation perceived by faculty members predict their Internet adoption?

8. Does the image attribute of innovation perceived by faculty members predict their Internet adoption?

9. Does the visibility attribute of innovation perceived by faculty members predict their Internet adoption?

10. Does the voluntariness attribute of innovation perceived by faculty members predict their Internet adoption?

11. Does the trialability attribute of innovation perceived by faculty members predict their Internet adoption?

Rate of Adoption

Analysis revealed a small number (9.9%) of faculty members at IMSU had not adopted the Internet for academic and research purposes. The remaining faculty members were Internet adopters; however, the rate of adoption was not high, reaching only approximately 50%, including those who used the Internet sometimes and rarely. The disparity in the adoption of Internet can be attributed to different factors. Rogers (2003) identified variables that affect an innovation's rate of adoption including factors influencing peoples' decision whether or not to adopt the innovation, the type of innovation-decision, the nature of communication channels that diffuse the innovation to a social system, and the extent to which promotional efforts are made to diffuse the innovation.

Demographic Differences

Gender factors have been studied to determine their influence on the decision to adopt the Internet by academic and research activities. The findings of the present study revealed there were no statistically significant differences among Internet adopters and non-adopters regarding

gender. This result corresponds with another study of faculty members' Internet use in the United States (Alshawi, 2002). In contrast, a previous study of faculty members in Saudi Arabia found that male faculty members used the Internet for instructional purpose and Web-based instruction (WBI) more often than female faculty members (Al saif, 2005).

How individuals perceive the Internet as a teaching and research tool influences their decision of whether or not to adopt the Internet. Men are more influenced by perceptions of usefulness of the technology, and women are more influenced by perceptions of how easy it is to use (Venkatesh & Morris, 2000).

Rogers (2003) states that adopters of new communication technologies are younger than non-adopters due to the fact that younger people are more adventurous in trying new innovations. The results of this study did not find statistically significant differences between adopters and non-adopters regarding age.

Academic rank was also investigated. A prior research found that Saudi Arabian faculty members with high academic rank are less likely to be interested in using the Internet. (Al Saif, 2005). This was not the situation in this study. Analysis indicated there are no statistically significant differences among adopters and non-adopters in terms of their academic rank.

The results also revealed no statistically significant differences exist between Internet adopters and non-adopters regarding the academic discipline variable. The highest percentage of faculty members using the Internet for academic and research activities was among science faculty members (92.9%), while the lowest percentage occurred among business faculty members (85.7%). Although this finding was consistent with a prior study that found science faculty members used Internet more than faculty members in other academic disciplines, (Al-Hazmi, 2004) found significant differences among faculty members in different disciplines. The

differences in the result between the two studies could be an indicator of a raise in awareness of the importance of the Internet for all disciplines.

In the last two demographic variables of income level and English proficiency, statistically significant differences were found among Internet adopters and non-adopters. The cost of the Internet in Saudi Arabia is still high compared to other countries. The price of an Internet provider for DSL is about 500SR ($140) a month. Free access to all faculty members in the university should be provided to diffuse the adoption of the Internet and eliminate the gap between faculty members in different income levels.

English language proficiency was statistically significantly different among Internet adopters and non-adopters. Surprisingly, those who rated their English proficiency at the good level were the smallest percentage (87.9%) of adopters among other categories, while the second highest percentage of adopters was those with poor English proficiency (96.3%). The reason for this unexpected result could be attributed to the differences in the number of participants in each category. Among all participants, 102 faculty members rated their English as good. In contrast, only 52 faculty members rated their English as poor.

Faculty Perception of Internet

Rogers (2003) concluded five main attributes of innovations affect the rate of adoption by individuals. In addition to these attributes, three variables identify by Moore and Benbasat (1991) were evaluated to identify which variables affected IMSU faculty members' decision to adopt the Internet. These variables included voluntariness, relative advantage, compatibility, result demonstrability, ease of use, image, visibility, and trialability.

When all variables were combined together for regression analysis, the entire model showed a significant relationship to the dependent variable of adoption. This result confirms Al-Fulih's (2002) study in that the combination of these variables predicts the Internet adoption

among Saudi Arabian faculty members. However, the results of this study disagree with Al-Fulih (2002) study regarding the affect of each attribute individually. The present study found each one of the diffusion variables was a significant predictor for the decision to adopt the Internet, while Al-Fulih found adoption was predicted by only three variables.

Individual analyses of each construe showed that the compatibility attribute was the strongest predictor and most influential attribute regarding Internet adoption. Relative advantage was the second strongest predictor, followed by image, ease of use, result demonstrability, trialability, visibility, and voluntariness respectively (see Table 46).

The R square values of ease of use, result demonstrability, trialability, visibility, and voluntariness are not high enough to be considered good predictors of Internet adoption. Although statistically significant, the small influence of these variables on the decision to adopt the Internet needs further investigation to interpret these unexpected results.

Table 46

A Summary of Multiple Regression Analysis of Variables Predicting Internet Adoption

Variable	*F*	*p*	R^2
Compatibility	11.898	< .001	.135
Relative advantage	6.245	< .001	.126
Image	7.459	< .001	.089
Ease of use	5.549	< .001	.084
Result demonstrability	7.459	< .001	.073
Trialability	6.330	.002	.040
Visibility	7.459	.006	.040
Voluntariness	4.735	.009	.030

As individual predictors, multiple regression analysis indicated that the voluntariness attribute explained 3% of the variance in predicting the adoption of the Internet. Voluntariness is the degree of an individuals' perception toward an innovation as being voluntary. Therefore, the result suggests that faculty members at IMSU considered the freedom of choice to reject or accept the Internet in their decision of adoption. Faculty members' responses indicated that both statements "using the Internet is not required by the university" and "using the Internet is certainly not compulsory" were significant predictors in the voluntariness attribute for the adopting the Internet.

Relative advantage attribute explained 12.6% of the variance in predicting the adoption, which confirms diffusion scholars' findings toward relative advantage as being one of the strongest predictors of adoption rate (Rogers, 2003). The strong influence of relative advantage was an expected result due to the importance of this attribute for individuals in their daily life. In addition to perceiving the innovation as being better than the idea it supersedes, it also included economic benefit, low cost, comfortability, social prestige, saving of effort and time, and immediacy of reward (Rogers, 2003). Among the seven items in relative advantage, the statement "using the Internet enables me to accomplish academic tasks faster" was the strongest predictor that influenced the rate of adoption. Also, the statement "using the Internet enhances my efficiency in the academic tasks" was as a significant predictor.

The compatibility construct was the strongest predictor of Internet adoption among faculty members, explaining 13.5% of the variance in predicting adoption. Compatibility is the degree to which an innovation is perceived as consistent with the sociocultural values and beliefs, previously introduced ideas, or client needs (Rogers, 2003). The effect of compatibility on an individual's decision to adopt the Internet is very apparent in a society such as Saudi Arabia. Saudi Arabia is a conservative society where Islamic and Arabic traditions are strictly

implemented in people's lives. As an open source, the Internet is full of information which goes against Islam and the Saudi Arabian culture. Hence, it is expected that people take this aspect into account when deciding to use new technologies. In fact, the delay in the decision to allow Internet connection throughout Saudi Arabia has been attributed to the need for an accurate filtering system to block inappropriate content. This result could be an indicator of people's satisfaction with the filtering system in terms of blocking information containing offensive values.

Three items in the compatibility construct were found to be significant predictors of adoption. These include the statements "Using the Internet for academic purposes is compatible with all aspects of my work," "Using the Internet for academic purposes is compatible with all religious and cultural aspects of my work," and "Using the Internet for personal needs (reading, news, sports, games, etc.) do not reduce the benefits of using the Internet for academic purposes."

The image construct also had a positive impact Internet adoption, explaining 8.9% of the variance in adoption. The statistically significant predictor of image variable was not a surprising result. The concept of image encompasses the enhancement of the status that individuals gain in their social system (Moore & Benbasat, 1991). Rogers (2003) argues that one of the most imperative motivations for almost any individual to adopt an innovation is the desire to gain social status. Saudi Arabia is a modern country where new technologies have required government attention and concern to augment the economy. Accordingly, a person with more knowledge obtained by implementing new technology has more prestige in the internal social system.

Amid the items of image construct, the statement "People in my university who use the Internet have a high profile" was the best predictor, followed by the statement "Using the

Internet improves my image within the university." The remaining two items in image construct were not significant predictors of adoption.

The ease of use attribute was the fourth strongest predictor explaining 8.4% of the variance in Internet adoption. Davis (1989) states that an application perceived to be free of complexity to use is more likely to be accepted by users. Likewise, Rogers (2003) asserts that complexity has a negative relationship with the rate of adoption. Therefore, ease of use is considered by faculty members when deciding whether to adopt the Internet or reject it. Ease of use was particulary important when combined with lack of training in how to use the Internet as reflected by faculty members' statements in the open-ended analysis.

Among the five items in ease of use construct, the only predictor was the statement "Learning to operate the Internet is easy for my." Other items on the construct were not statistically significant predictors of the adoption.

Result demonstrability was the fifth statistically significant predictor, explaining 7.3% of the variance in Internet adoption. This result opposed Al-Fulih's (2002) study findings which showed result demonstrability by itself was not a statistically significant predictor of Internet adoption by Saudi Arabian faculty members. Al-Fulih felt that Moore and Benbasat's (1991) decision to split Rogers (2003) observability construct into two separate constructs of visibility and result demonstrability caused the results of his study regarding result demonstrability to be statistically insignificant. On the contrary, the results of the present study found observability's separation did not reduce the impact of visibility and result demonstrability as predictors of Internet adoption.

In result demonstrability, both included items were statistically significant predictors. The statements were "The result of using the Internet are apparent to me.," and "I would have difficulty explaining why using the Internet may or may not be beneficial."

The visibility construct was a statistically significant predictor of adoption, explaining 4% of the variance in Internet adoption. Visibility is defined as the degree to which others can see an innovation is being used (Benham & Raymond, 1996). High visibility of an innovation in the community positively influences its adoption because over time, the community realizes the importance of the innovation. Internet visibility in Saudi Arabia is now increasing, especially with the increase number of Internet services providers (ISPs) and the spread of Internet cafes through the major cities.

Two items on visibility construct were statistically significant predictors regarding the decision to adopt the Internet. These included the statements "I have seen the Internet in use outside my university," and "The Internet is not visible in my university."

The last attribute of innovation is trialability, which is the degree to which the Internet may be experimented with on a limited basis (Rogers, 2003). The findings of this study showed this attribute as a weak predictor of faculty members' Internet adoption. The reason for this result could be due to the lack of training available for using Internet applications and services. The traditional ways of teaching and learning in IMSU might be another reason the trialability attribute was not influence on faculty members' decisions to adopt the Internet. Specifically in teaching, faculty members did not find themselves needing to explore different types of Internet applications for class activities because not all students had access to the Internet, and the classrooms were not connected to the Internet as well. Low English language skills and the lack of application trial versions in Arabic could also explain faculty members' reluctance to adopt the Internet. The following two statements in the trialability attribute were statistically significant predictors of Internet adoption: "I have had a great deal of opportunity to try various Internet applications," and "I know where I can surf to satisfactorily try out various uses of the Internet."

Recommendation

Based on the findings of this study, the following recommendations are presented for enhancing IMSU of faculty members' adoption of the Internet:

1. All attributes of innovations examined in this study were found to be statistically significant predictors of Internet adoption, so it is recommended the IMSU administration concentrate on the factors that enhance aspects of each one of the attributes, allowing all faculty members to utilize Internet resources in their research and teaching activities. The strategy should be planned based on the needs and skills of faculty members through conducting relevant research for this purpose.

2. IMSU administration needs to develop a new strategy plan to integrate Internet applications into the academic environment. This might include providing each faculty member with a computer and Internet access in his or her office. The findings disclosed that female faculty members are not provided with Internet connection. Thus, their campus needs more attention to give equal service for both genders.

3. Many of faculty members did not receive adequate technology training opportunities. To overcome this barrier, training programs should be held on a regular basis to instruct faculty members on the use of different Internet applications and services. The library may take the responsibility for arranging such activities and provides locations for training. Individual training upon request by faculty members is another way to diffuse Internet adoption. Individual training is critical to address individual faculty members' unique needs. During training, increasing the trialability should be taken into consideration. The perceived attribute of trialability was not statistically significant predictor of Internet adoption. Therefore, faculty members should be given the opportunity to try out different Internet applications, especially applications that support research and teaching activities.

4. Faulty members' English proficiency needs to improve since the majority of Internet content is written in English. The findings of this study revealed that the English level of most faculty members is average or below. This skill can be improved by encouraging faculty members to enroll in English courses. Additionally, IMSU could offer faculty members scholarships to English speaking countries, especially for faculty members who received their degrees from Saudi Arabian or Arabic universities.

5. Increasing the awareness of the importance of the Internet in teaching and research is recommended. Many methods are available to spread awareness among faculty members. One method is to demonstrate successful experiments and projects implemented in similar environments, particularly in developed countries. Another method is to provide more computer labs through IMSU and to connect classrooms with the Internet.

6. Faculty members should be supported and encouraged to employ Web-based instruction in class activities and assignments. This can be accomplished by creating an interactive Web site for classes where students can access class assignments, supplemental information related to study topic, and communicate with each other through discussion forums. Entire courses can also be taught using appropriate software such as WenCT.

APPENDIX A

QUESTIONNAIRE

Please select the most appropriate answers that indicate the level of your agreement or disagreement with each statement.

Section 1

1. Do you use the Internet for academic purposes?
   - No
   - Rarely (once a moth)
   - Sometimes (twice a month)
   - Often (once a week)
   - Constantly (once or more a day)

If your answer is no, please skip from here to section 3.

Section 2

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
2. Using the Internet is not required by the university.					
3. Although it might be helpful, using the Internet is certainly not compulsory in my job.					
4. Using a the Internet enables me to accomplish academic tasks faster					
5. Using the Internet improves the quality of work that I do.					
6. Using the Internet makes it easier to do my job.					
7. Overall, I find using the Internet to be beneficial in my job.					
8. Using the Internet enhances my efficiency in the academic tasks.					
9. Using the Internet gives me greater control over my work.					
10. Using the Internet increases my productivity.					
11. Using the Internet for academic purposes is compatible with all aspects of my work.					
12. Using the Internet for academic purposes is compatible with all religious and cultural aspects of my work.					
13. Using the Internet fits well with the mode I like to work.					
14. Using the Internet for personal needs (reading news, sports, games, etc.) do not reduce the benefits of using the Internet for academic purposes.					
15. Using the Internet improves my image within the university.					
16. People in my university who use the Internet have more prestige than those who do not.					
17. People in my university who use the Internet have a high profile.					
18. Having the Internet is a status symbol in my university.					

19. My use of the Internet requires a lot of mental and learning efforts.					
20. Using the Internet is often frustrating.					
21. I believe that it is easy to get the Internet to achieve what I want it to do.					
22. English language is not a barrier when I use the Internet					
23. Learning to operate the Internet is easy for me.					
24. The results of using the Internet are apparent to me.					
25. I would have difficulty explaining why using the Internet may or may not be beneficial.					
26. In my university, one sees the Internet connected to many computers.					
27. I have seen the Internet in use outside my university.					
28. The Internet is not very visible in my university.					
29. I have had a great deal of opportunity to try various Internet applications.					
30. I know where I can surf to satisfactorily try out various uses of the Internet.					

Section 3

31. What is your gender?

Male □ Female □

What is your age group?

20-29 □ 30-39 □ 40-49 □ 50-59 □ 60 or more □

32. What is your academic rank?

Professor □ Associate professor □ Assistance professor □ Lecturer □

33. What is your field of study?

Social Science □

Religious □

Languages □

Business □

Science □

34. What is you monthly income?

5000SR-7999SR □ 8000SR-10999SR □ 11000SR-13999SR □ More than 14000SR □

35. What is your English language proficiency?

None □ Poor □ Average □ Good □ Very Good □

36. What are the most important barriers preventing you from using the Internet for academic purposes?

_____
_____
_____
_____
_____
_____
_____

Please, add any comment you want to include.

_____
_____
_____
_____
_____
_____
_____
_____

APPENDIX B

ARABIC VERSION OF THE QUESTIONNAIRE

الاستبانة

الرجاء اختيار الإجابة المناسبة التي توضح درجة موافقتك او عدم موافقتك على كل عبارة ممايلي:

القسم الأول

1- هل تستخدم الإنترنت لأداء أعمالك الأكاديمية؟

لا ☐
نادراً ☐
أحياناً ☐
دائماً ☐
بشكل متكرر ☐

إذا كانت إجابتك (لا) الرجاء الإنتقال للقسم الثالث.

القسم الثاني

رقم	العبارة	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
2	استخدام الانترنت ليس متطلباً من قبل الجامعة					
3	على الرغم من أهمية الانترنت، إلا أن استخدامها ليس إلزامياً في مجال عملي					
4	استخدام الانترنت يجعلني قادراً على إنجاز أعمالي الأكاديمية بشكل سريع					
5	استخدام الانترنت يزيد من فعالية أعمالي الأكاديمية					
6	استخدام الانترنيت يساعد على تسهيل الأعمال التي أنجزها					
7	بشكل عام، أعتقد أن استخدام الانترنت مفيد في عملي					
8	استخدام الانترنت يعطيني قدرة أفضل على التحكم في عملي					
9	استخدام الانترنت يزيد من انتاجيتي					
10	استخدام الانترنت للأغراض الأكاديمية يتوافق مع كافة المتطلبات في مجال عملي					
11	استخدام الانترنت للأغراض الأكاديمية يتوافق مع كافة التعاليم الدينية والجوانب الثقافية للمجتمع					
12	استخدام الانترنت يتناسب مع الطريقة التي أحبها لأنجاز عملي الأكاديمي					
13	استخدام الإنترنت للأغراض الشخصية (قراءة الأخبار، الرياضة، الألعاب...الخ) لايؤثر على استفادتي من الإنترنت للأغراض الأكاديمية					
14	استخدام الانترنت يحسن من صورتي في الجامعة					
15	الاشخاص الذين يستخدمون الانترنت في الجامعة يحظون بمكانة أفضل من الذين لايستخدمونها					
16	الأشخاص الذين يستخدمون الانترنت في الجامعة يحظون بفرص وظيفية مميزة					
17	الحصول على الانترنت في الجامعة يدل على المكانة المرموقة للشخص الحاصل عليها					
18	استخدام الانترنت يتطلب مني الكثير من الجهد الفكري والتدريب					

19	استخدام الانترنت كثيراً مايصيب بالإحباط					
20	بشكل عام أعتقد أنه من السهل استخدام الانترنت لأحتياجاتي الأكاديمة					
21	اللغة الأنجليزية لاتشكل عائقاً أمامي للإستفادة من الإنترنت					
22	تعلم استخدام الانترنت وتطبيقاتها سهل بالنسبة لي					
23	نتائج استخدام الانترنت واضحة بالنسبة لي					
24	أجد صعوبة في الشرح للآخرين عن مساوئ وفوائد الانترنت					
25	أي شخص في الجامعة التي أعمل بها يستطيع رؤية الانترنت مربوطة بالعديد من الحواسب الآلية					
26	سبق لي رؤية الآخرين يستخدمون الانترنت خارج نطاق الجامعة					
27	خدمة الانترنت ليست ظاهرة للعيان في الجامعة					
28	سبق وأن أتيحت لي فرص كثيرة لتجريب استخدام بعض تطبيقات الانترنت					
29	لدي معرفة بالمواقع التي تتيح لي تجربة العديد من تطبيقات الانترنت					

القسم الثالث:

30- الجنس: ذكر □ أنثى □

31- العمر: 20-29 سنة □ 30-39 سنة □ 40- 49 سنة □ 50-59 سنة □ 60 سنة أو أكثر □

32- الرتبة الأكاديمية: استاذ □ استذ مشارك □ استاذ مساعد □

33- التخصص الأكاديمي: علوم اجتماعية □ دين □ لغات □ علوم إدارية □ تربية □ علوم □
آخر اذكره من فضلك: .....

34- دخلك الشهري: 5000- 7999 ريالاً □ 8000-10999ريالاً □ 11000-13999ريالاً □ 14000ريالاً أو أكثر □

35- مهارتك في إتقان اللغة الإنجليزية: لاأجيدها □ ضعيفة □ متوسطة □ جيدة □ جيدة جداً □

36- ماهي أبرز المعوقات التي تحول دون استخدامك للانترنت لأغراضك الأكاديمية؟

_____
_____
_____
_____
_____
_____
—

من فضلك أضف أي ملاحظات تدون ذكرها فيما يتعلق بمجال هذه الدراسة.

_____
_____
_____
—
_____
_____
_____
_____
_

APPENDIX C

LETTER OF ACCEPTANCE BY UNIVERSITY OF NORTH TEXAS INSTITUTIONAL REVIEW BOARD

UNT
UNIVERSITY OF
NORTH TEXAS
DISCOVER THE POWER OF IDEAS

RESEARCH AND TECHNOLOGY TRANSFER
Office of Research Services

December 18, 2006

Abdullah Almobarraz
School of Library and Information Sciences
University of North Texas

RE: Human Subjects Application No. 06-453

Dear Mr. Almobarraz:

In accordance with 45 CFR Part 46 Section 46.101, your study titled "Factors Impacting Diffusion of Internet Adoption among the Faculty Members of Imam Mohammed Bin Saud Islamic University" has been determined to qualify for an exemption from further review by the UNT Institutional Review Board ((IRB).

Enclosed is the consent document with stamped IRB approval. Please copy and **use this form only** for your subjects.

No changes may be made to your study's procedures or forms without prior written approval from the UNT IRB. Please contact Shelia Bourns, Research Compliance Administrator, ext. 3940, if you wish to make any such changes.

Sincerely,

Scott Simpkins, Ph.D.
Chair
Institutional Review Board

SS:sb

P.O. Box 305250 | Denton, Texas 76203-5250 | TEL 940.565.3940 | FAX 940.565.4277 | TTY 940.369.8652 | www.unt.edu

APPENDIX D

INTRODUCTORY LETTER TO FACULTY MEMBERS OF

IMAM MOHAMMED BIN SAUD UNIVERSITY

(IN ENGLISH AND ARABIC)

Dear faculty member,

I am a doctoral student at University of North Texas in the United States. The attached questionnaire is a part of my dissertation focusing on the use of the Internet among the faculty members of Imam Mohammed Bin Saud University. The research study is intended to examine the attributes of diffusion of innovation theory and their affects on the decision to adopt the Internet for academic purposes. This study is not expected to be of any direct benefit to you, but may benefit the Imam University by learning more about Internet uses among faculty members in order to improve the service and provide any necessary training for its faculty members.

Your responses will be recorded anonymously and treated in a confidential manner. No personally identified information is requested in the questionnaire. Participation in filling out this survey is voluntary and should not take more than 10 minutes. There are no foreseeable risks involved in this study.

This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

If you have any questions about the study, please contact me or my faculty advisor at the numbers listed below. After completing the survey, please send it to the secretary of the department of Library and Information Sciences at the College of Social Sciences at the Imam Mohammed Bin Saud University. The secretary can be contacted at 258-5922. You may keep this notice for your records.

Thank you,

APPROVED BY THE UNT IRB
FROM 12/18/06 TO 12/17/07

Sincerely,

Abdullah Almobarraz
Phone number: 0019405950247
aboziad@gmail.com
P.O.Box 309448
Denton, TX 76203
Major advisor: Brian O'Connor
School of Library and Information Sciences
940-565-2347

الأخ الفاضل عضو هيئة التدريس

السلام عليكم ورحمة الله وبركاته، وبعد:

أفيدكم بأني أحد طلاب الدكتوراه بجامعة شمال تكساس بالولايات المتحدة. حيث أرفق لكم الإستبانة الخاصة بإعداد رسالة الدكتوراه عن استخدام الإنترنت من قبل أعضاء هيئة التدريس بجامعة الإمام محمد بن سعود الإسلامية. وهي تركز على دراسة خصائص نظرية انتشار الاختراعات وأثرها في اتخاذ القرار نحو استخدام الإنترنت للأغراض الأكاديمية. هذه الدراسة لايتوقع أن يكون لها فوائد مباشرة لكم، ومع ذلك فقد تساعد جامعة الإمام في التعرف على واقع استخدام الإنترنت من قبل أعضاء هيئة التدريس بالجامعة لأجل السعي نحو تطوير خدماتها وإعداد البرامج التدريبية اللازمة لذلك.

إجاباتكم على أسئلة هذه الإستبانة لاتتطلب ذكر الأسم أو أية معلومات شخصية أخرى قد تساعد في التعرف عليكم، كما أن تحليلها سوف يتم بطريقة سرية. علماً أن المشاركة في تعبئة الإستبانة تطوعي وغير إلزامي ولايحتاج أكثر من عشرة دقائق فقط. كما لايتوقع أن تكون ثمة مخاطر من القيام بهذه الدراسة.

وأفيدكم بأن هذه الدراسة قد تم مراجعتها من قبل لجنة المراجعة العلمية بجامعة شمال تكساس، حيث يمكن الإتصال بهم للإستفسار عن هذا البحث أو عن حقوقكم الشخصية على هاتف 3940-565(940).

إذا كان لديكم أية أسئلة حول هذه الدراسة، يمكنكم الإتصال بي او بالمشرف الدراسي على الهواتف المدرجة أدناه.

وبعد إكمال تعبئة الإستبانة، الرجاء إرسالها لأمين قسم المكتبات والمعلومات بكلية العلوم الإجتماعية في جامعة الإمام محمد بن سعود الإسلامية، حيث يمكنكم الإتصال به على هاتف 5922-258. كما يمكنكم أيضاً الإحتفاظ بهذا الخطاب إن رغبتم في ذلك.

شاكراً لكم طيب تعاونكم، وتقبلوا خالص تحياتي،،،

المبتعث

عبدالله بن إبراهيم المبرز

هاتف 0019405950247

aboziad@gmail.com

العنوان:

P.O.Box 309448

Denton, TX 76203

Major advisor: Brian O'Connor

School of Library and Information Sciences

940-565-2347

APPROVED BY THE UNT IRB

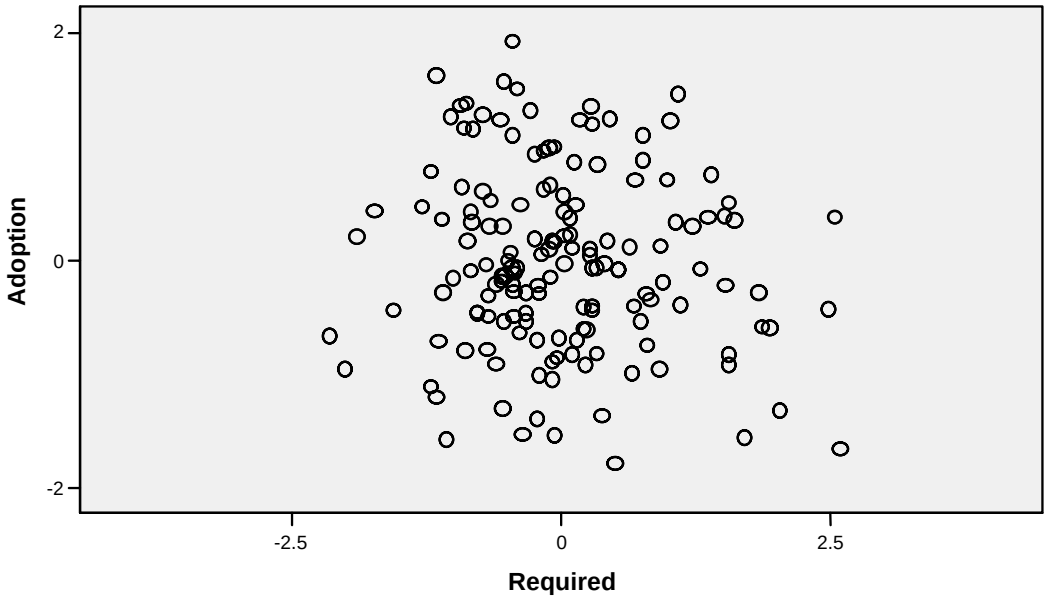
FROM 12/18/06 TO 12/17/07

APPENDIX E

PARTIAL REGRESSION PLOTS FOR DEPENDENT VARIABLES

Partial Regression Plot

Dependent Variable: Adoption



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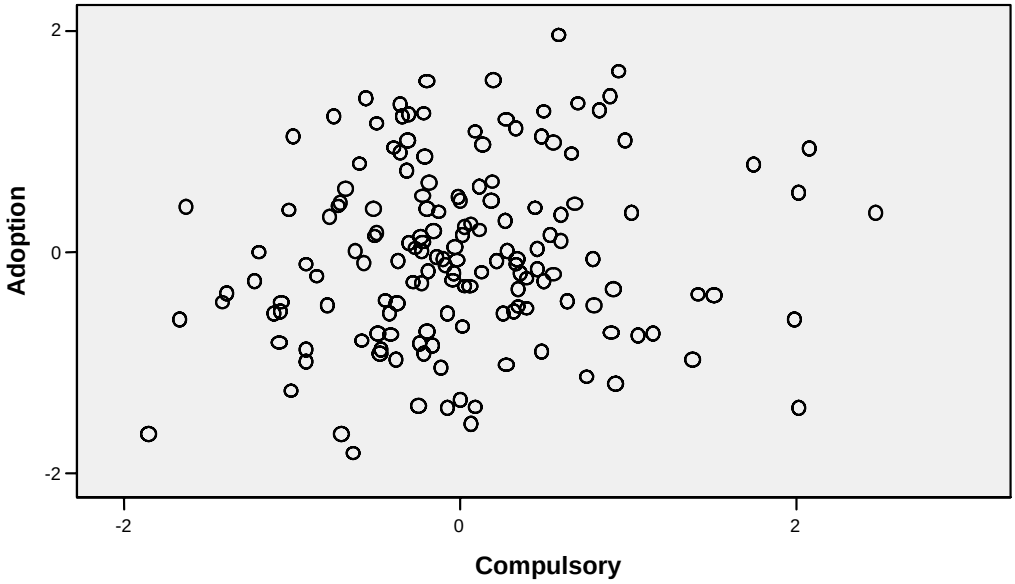
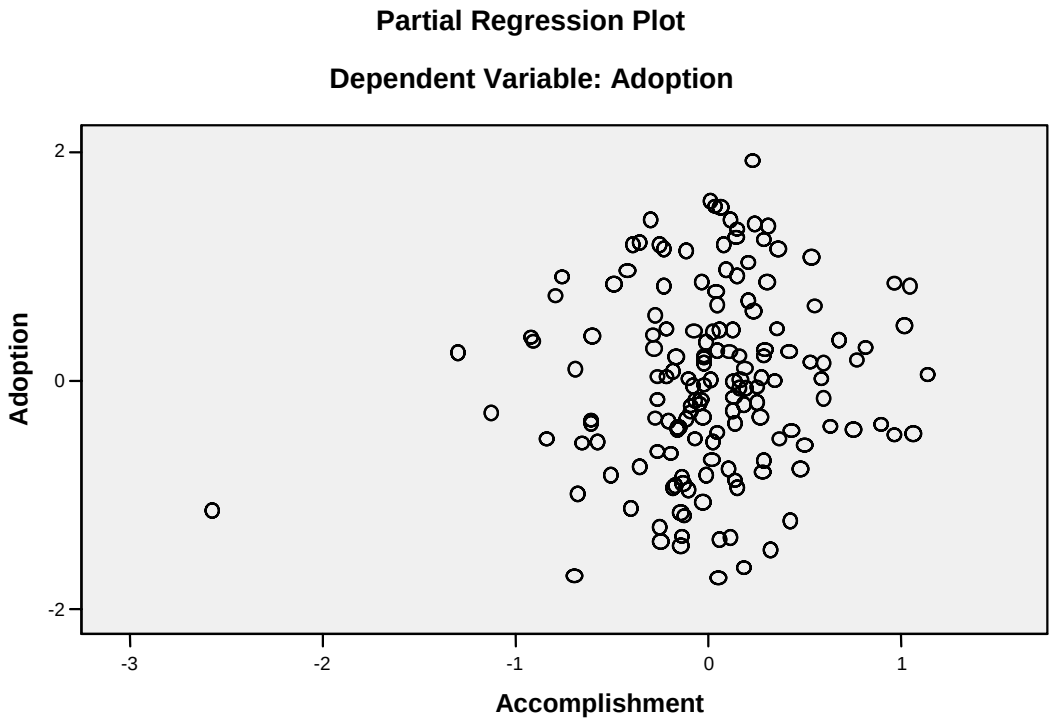
Dependent Variable: Adoption

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Adoption
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0
1
Accomplishment


Partial Regression Plot
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-0.3
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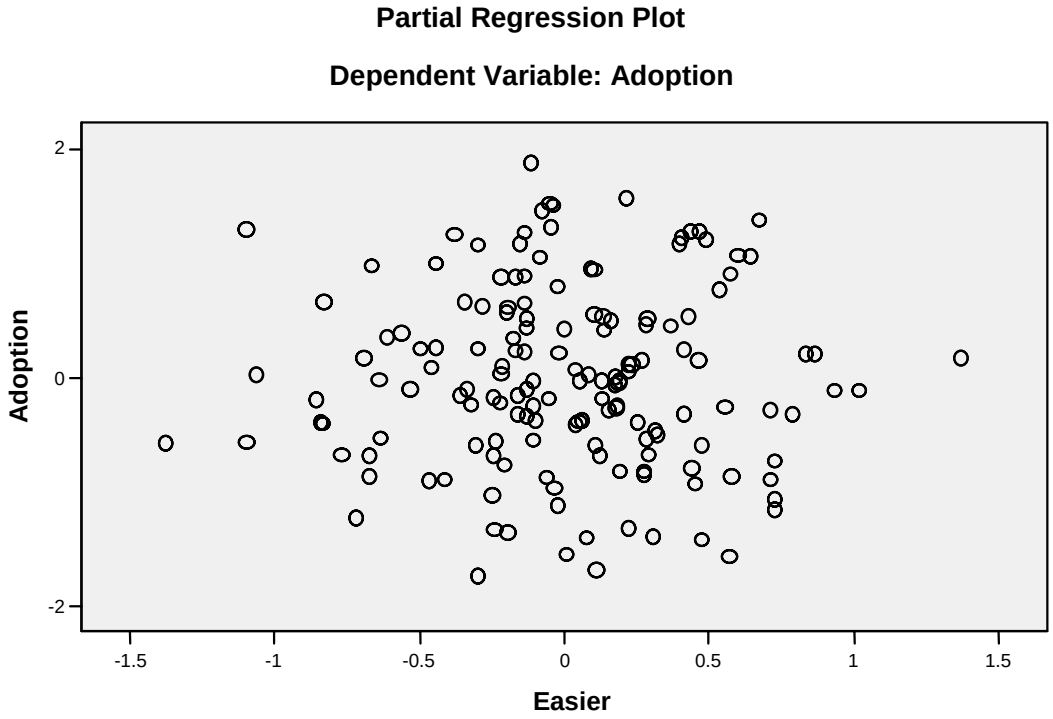
0.6
0.9
Improvement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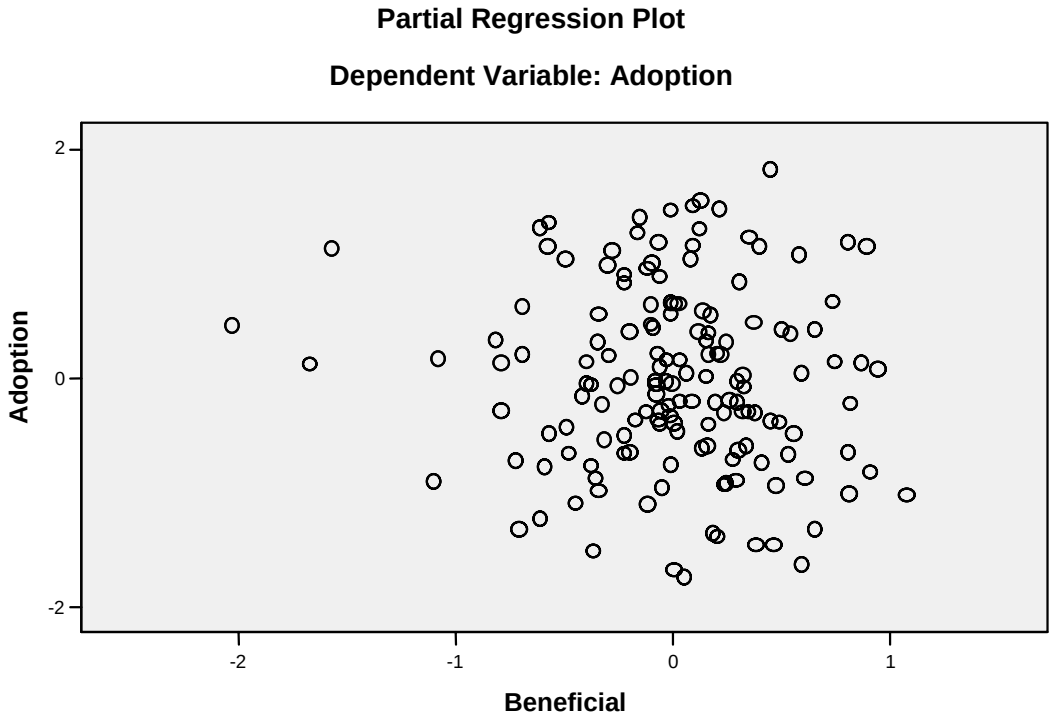
Easier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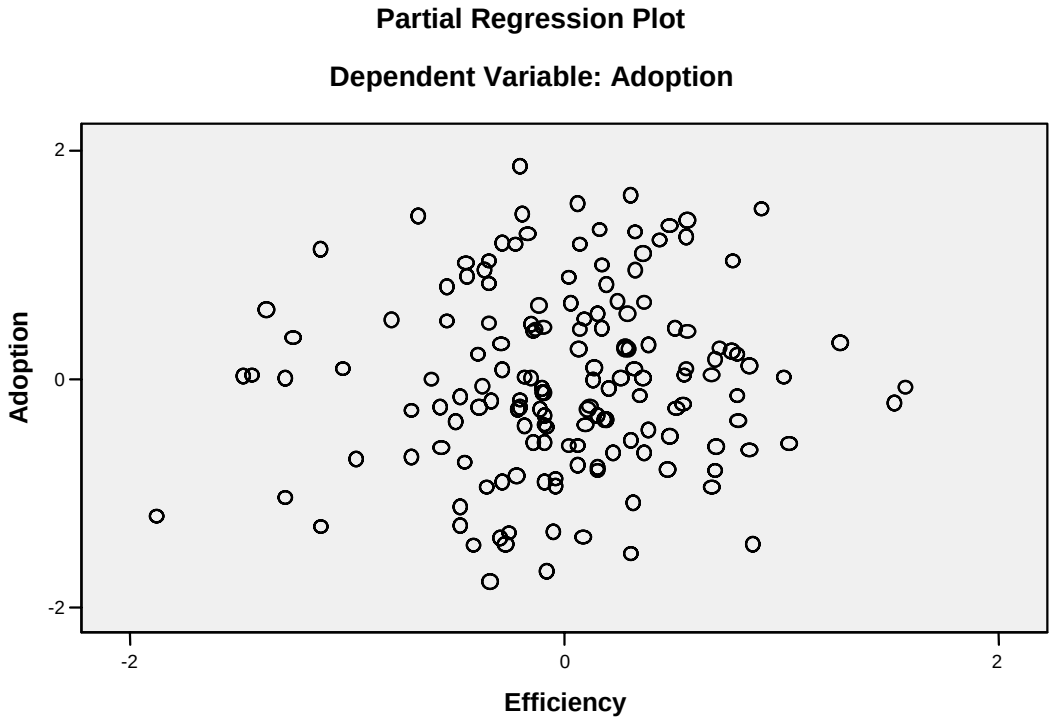
Beneficial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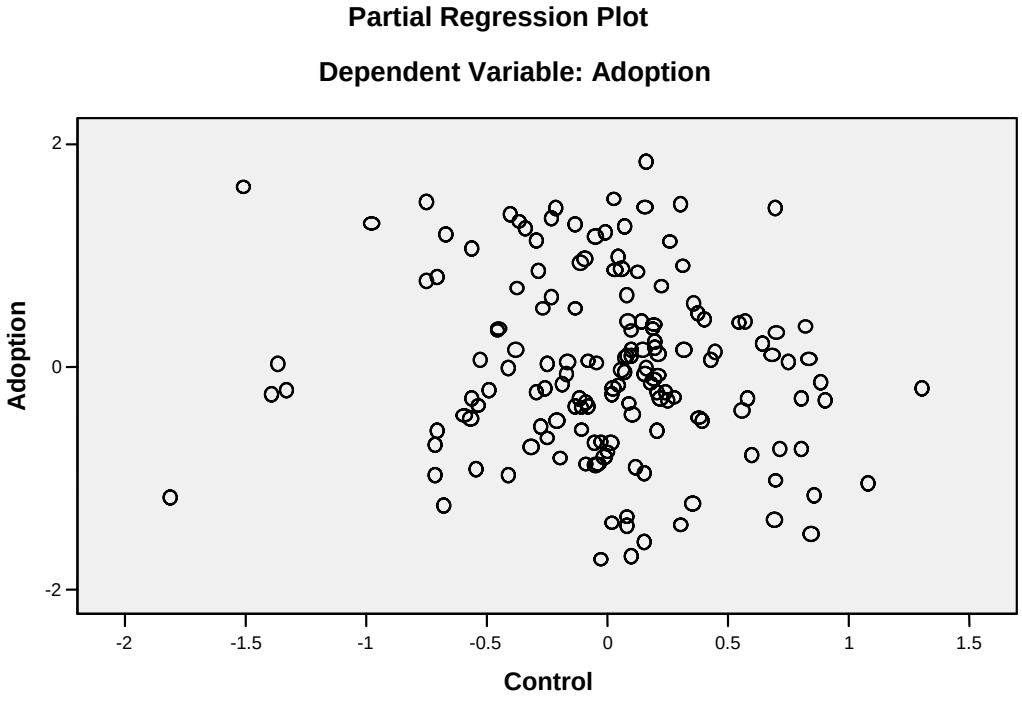
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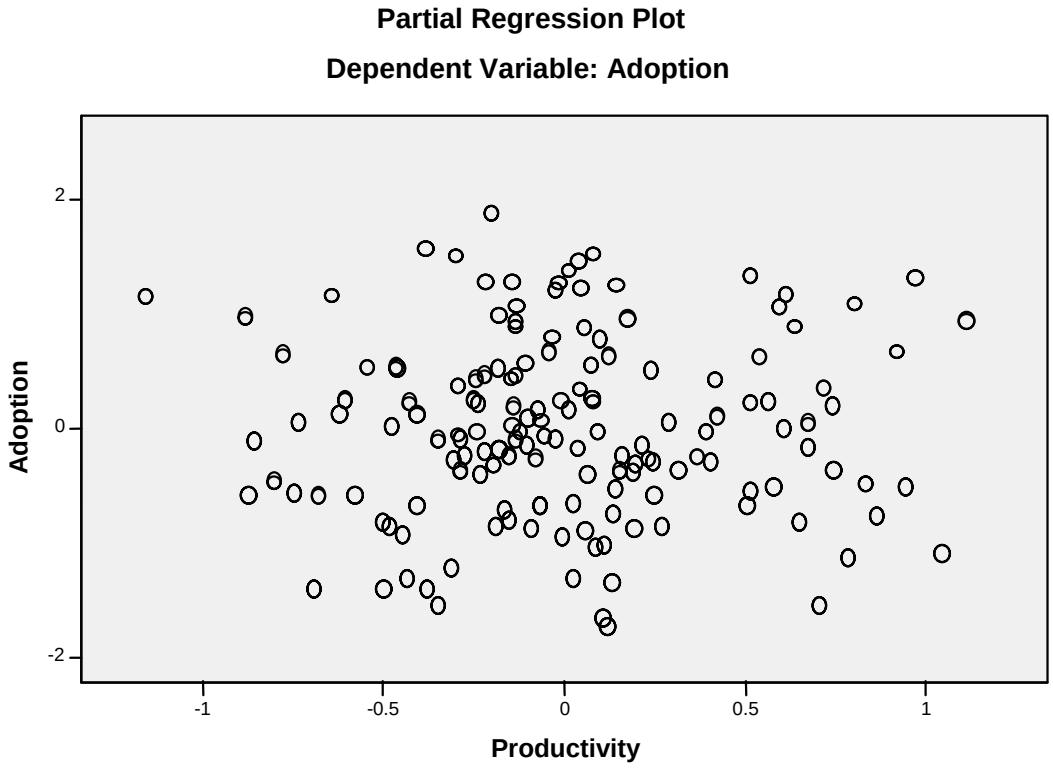
Control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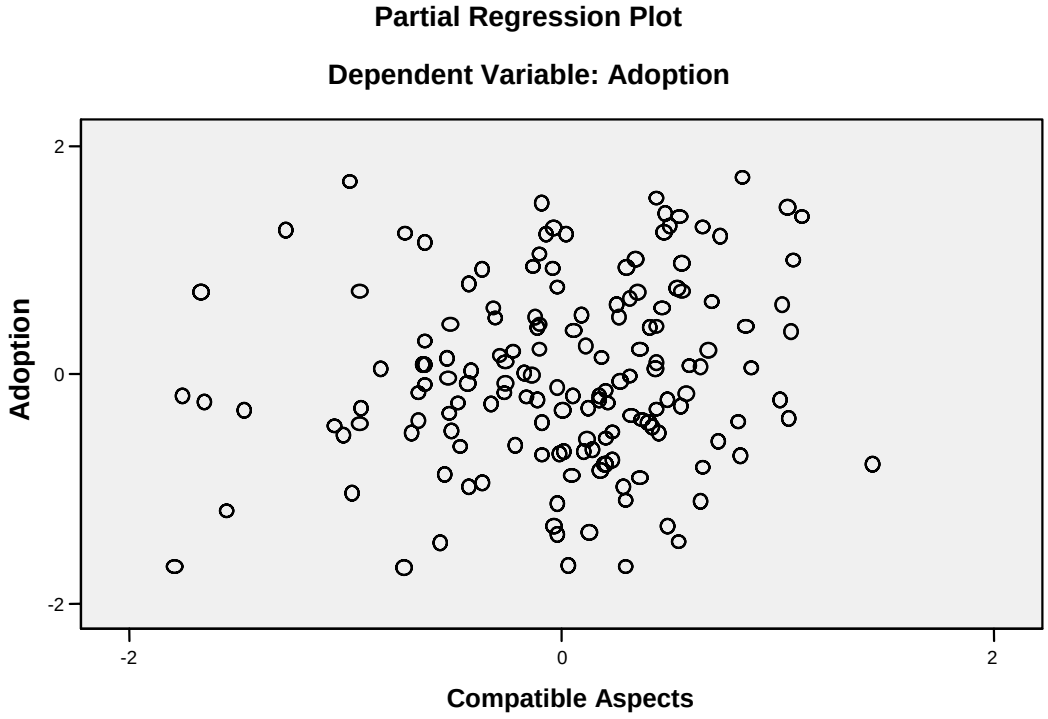
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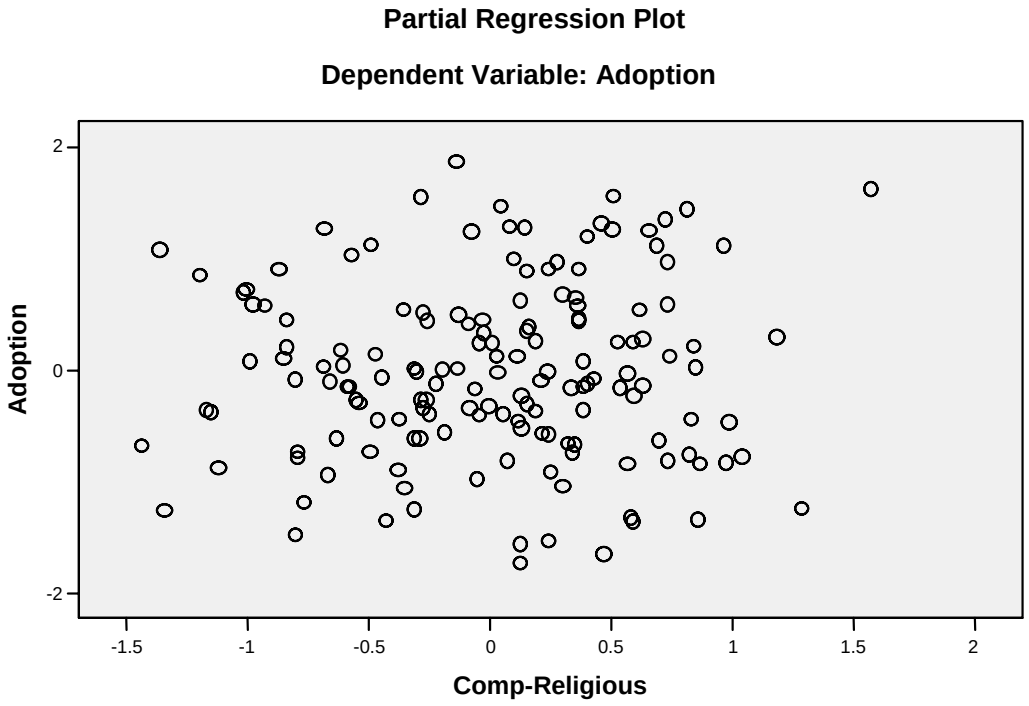
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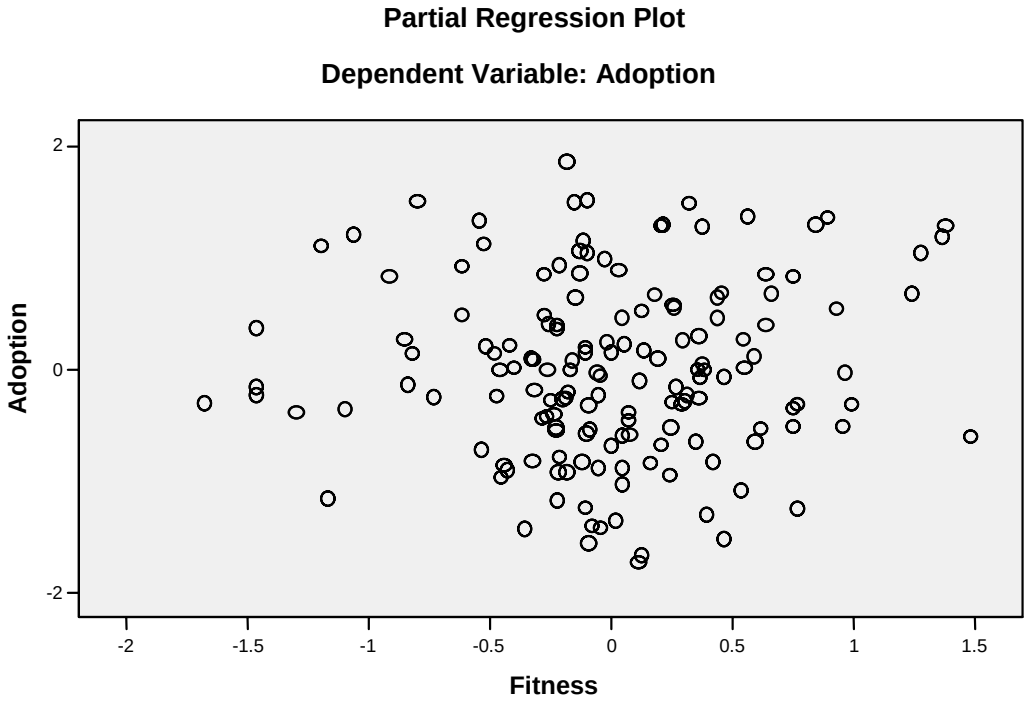
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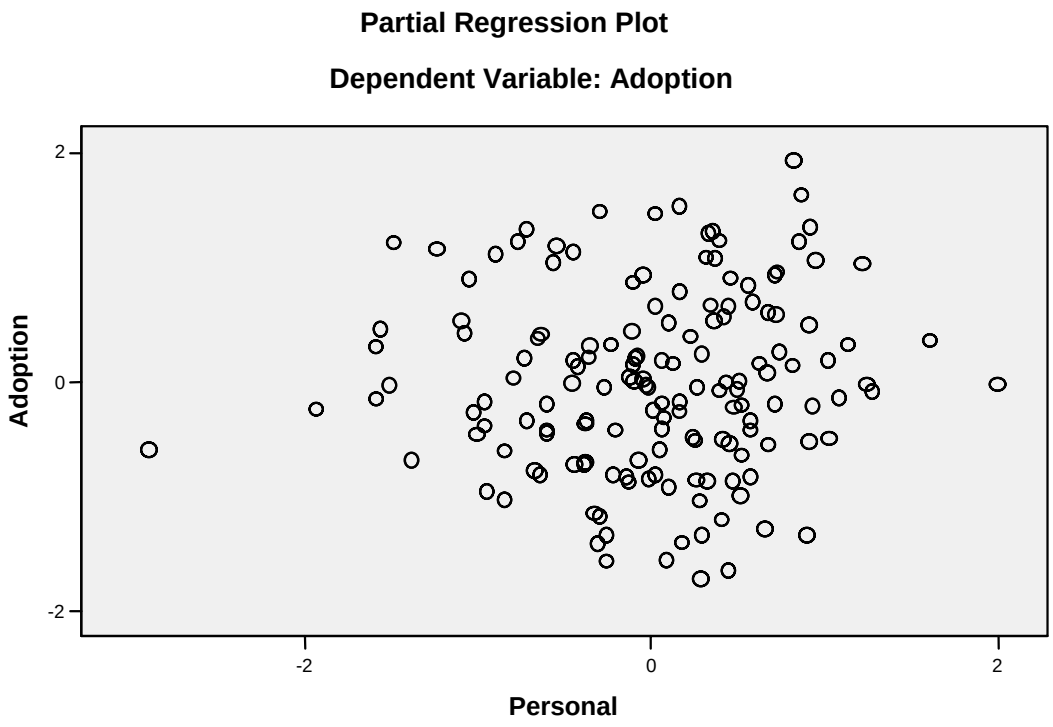
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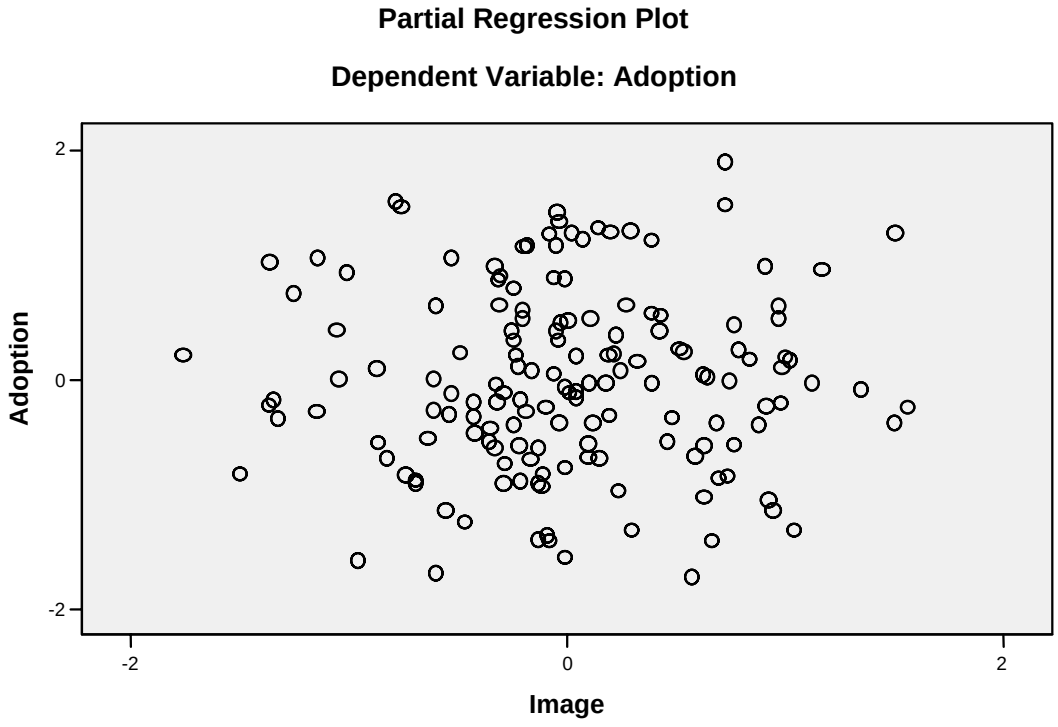
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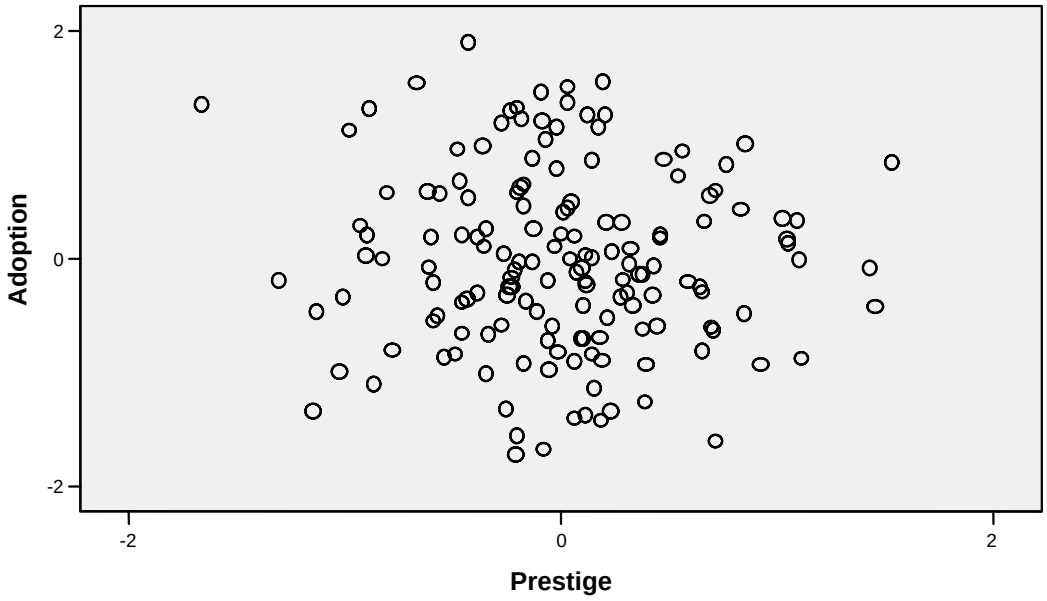
Image

Partial Regression Plot

Dependent Variable: Adoption



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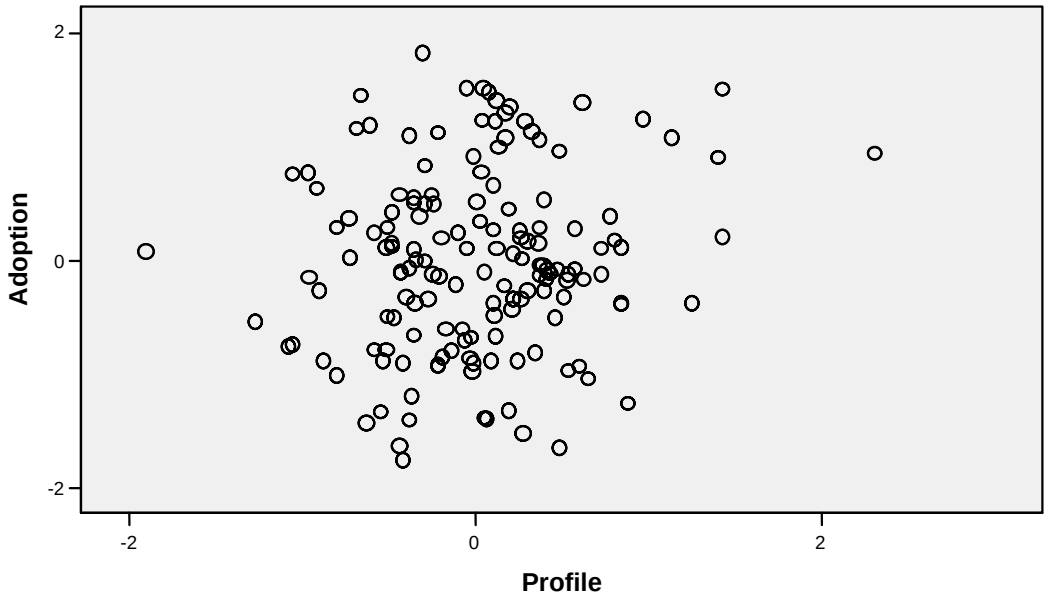

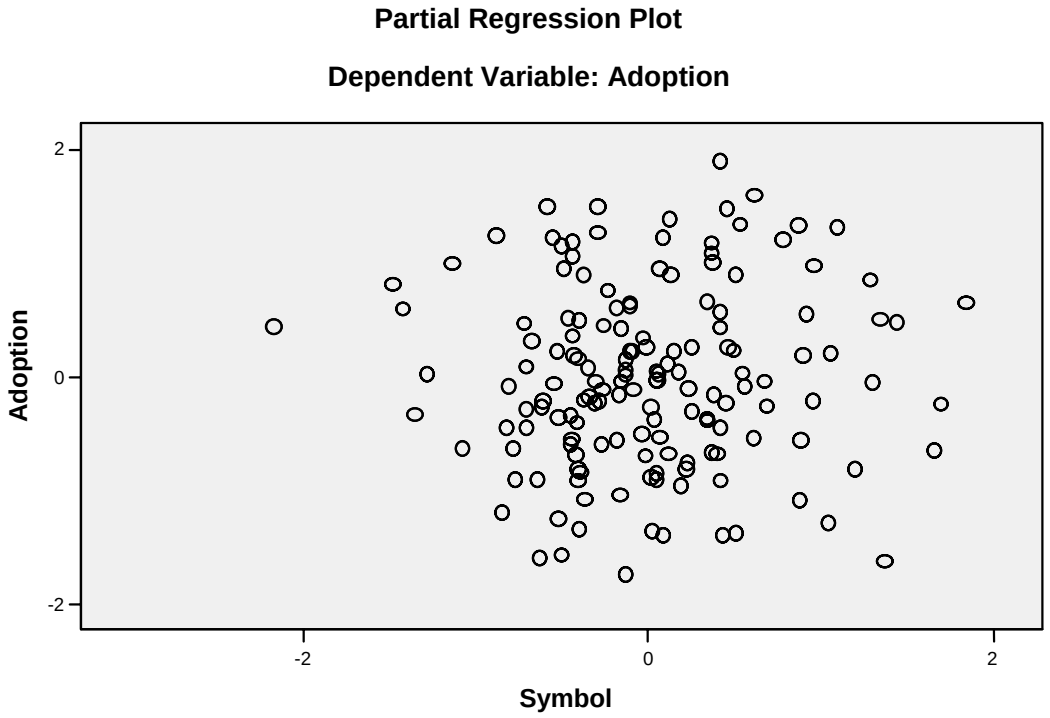
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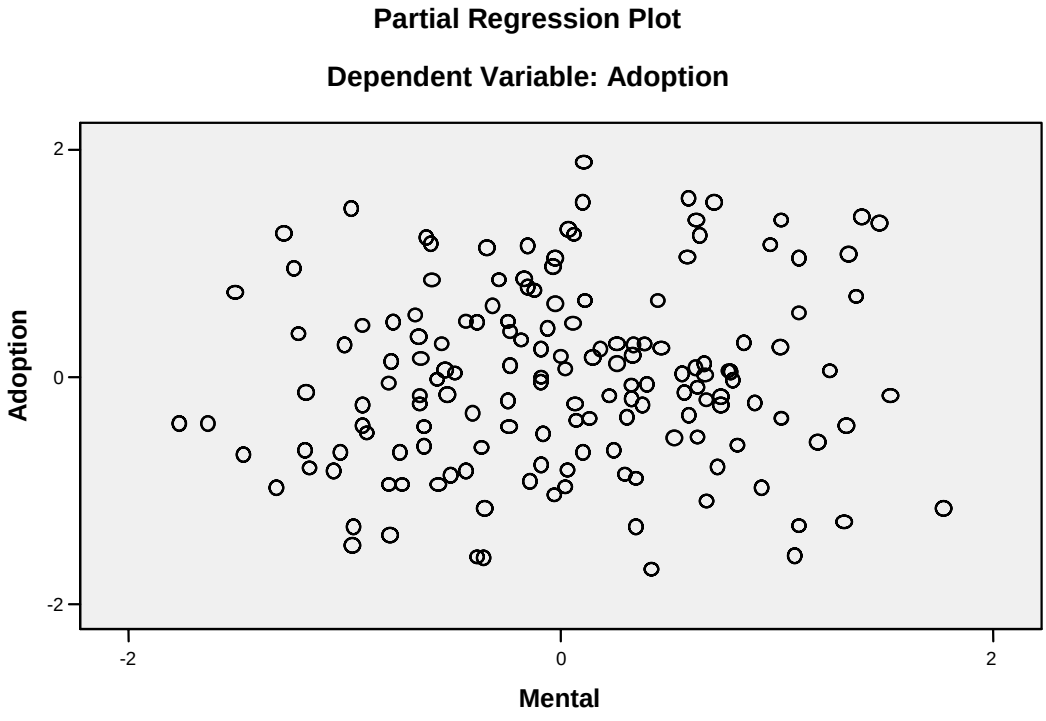
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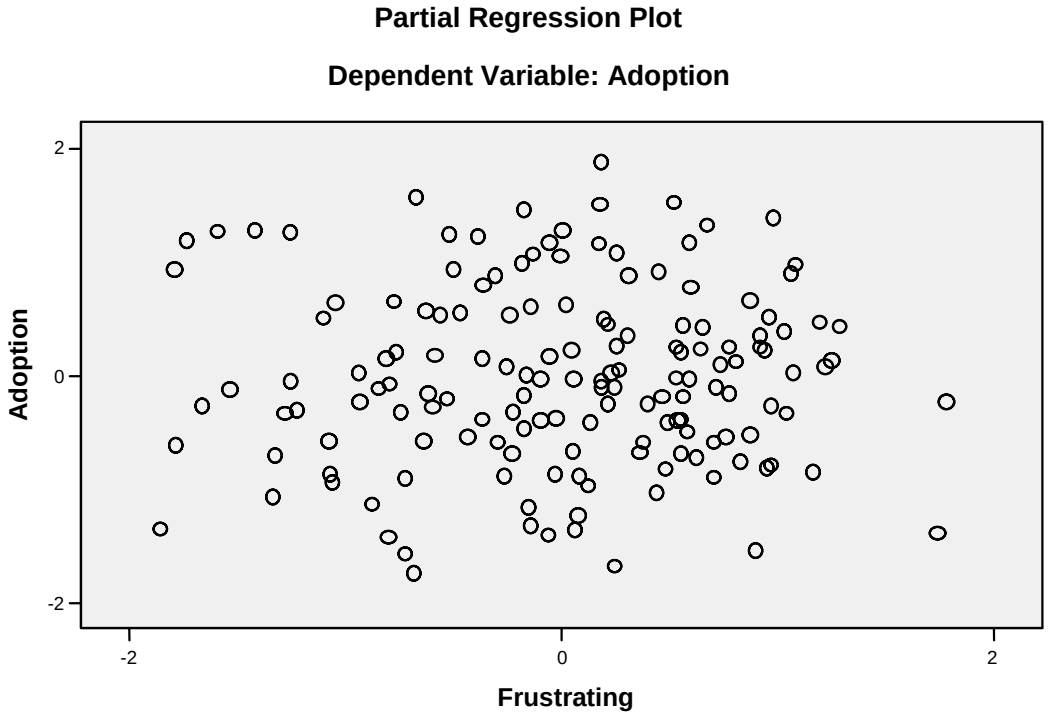
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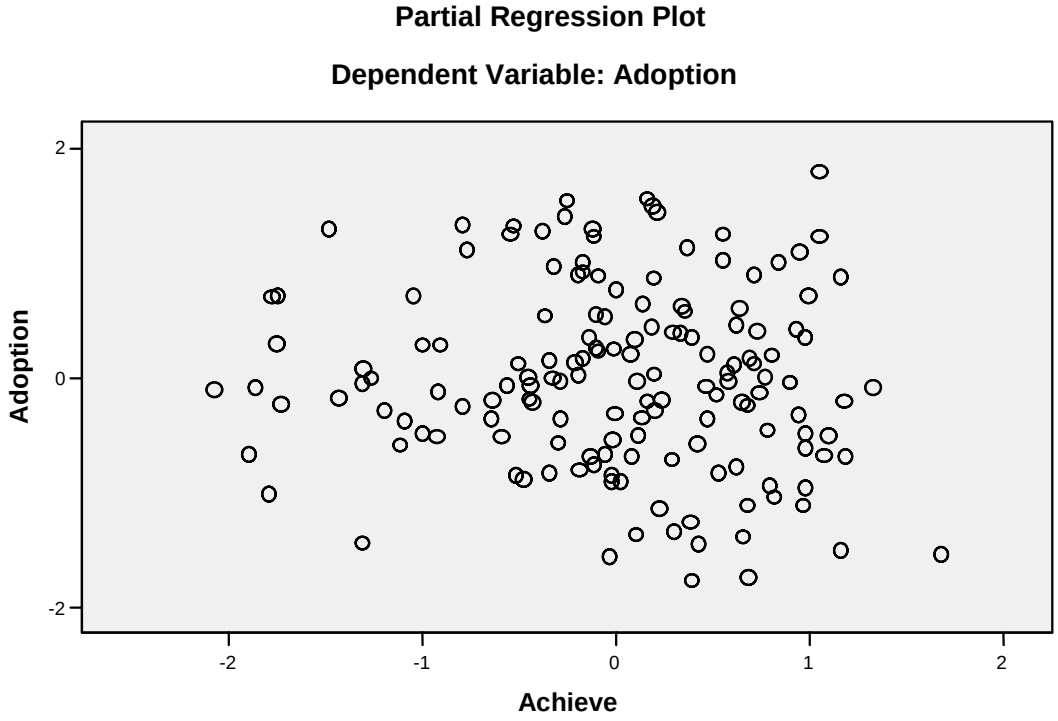
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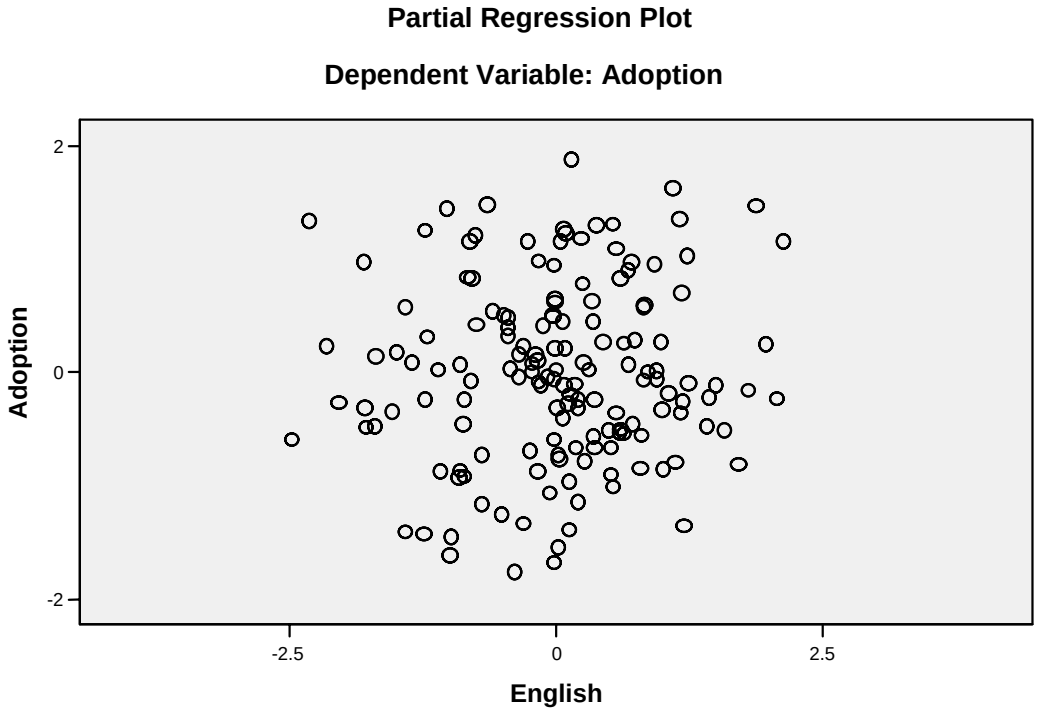
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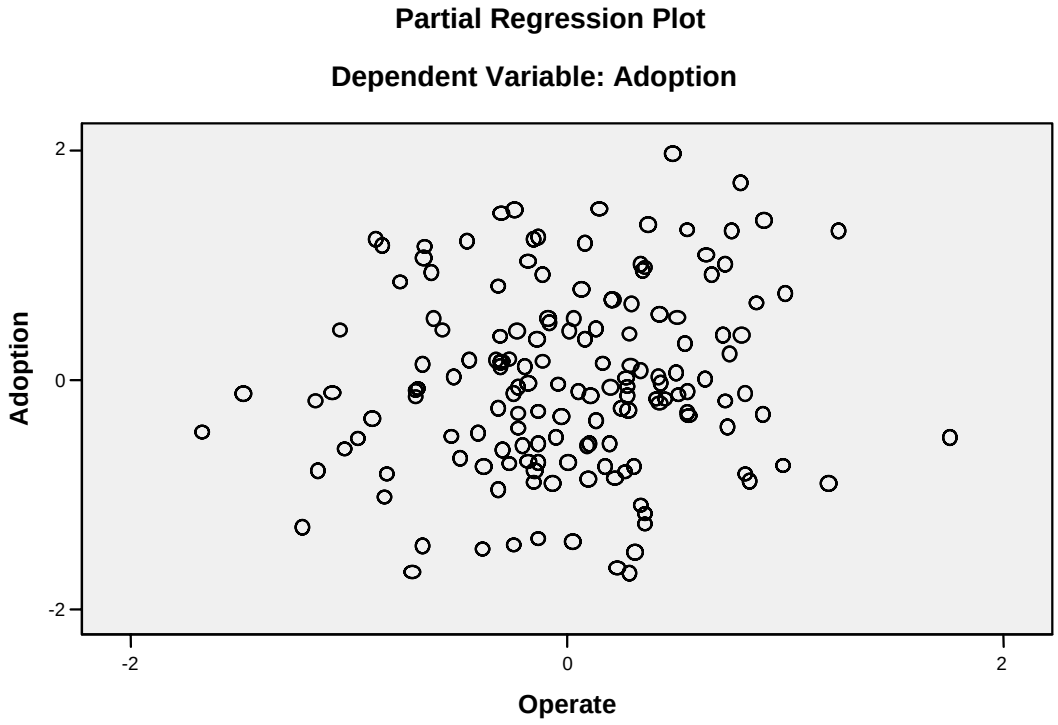
English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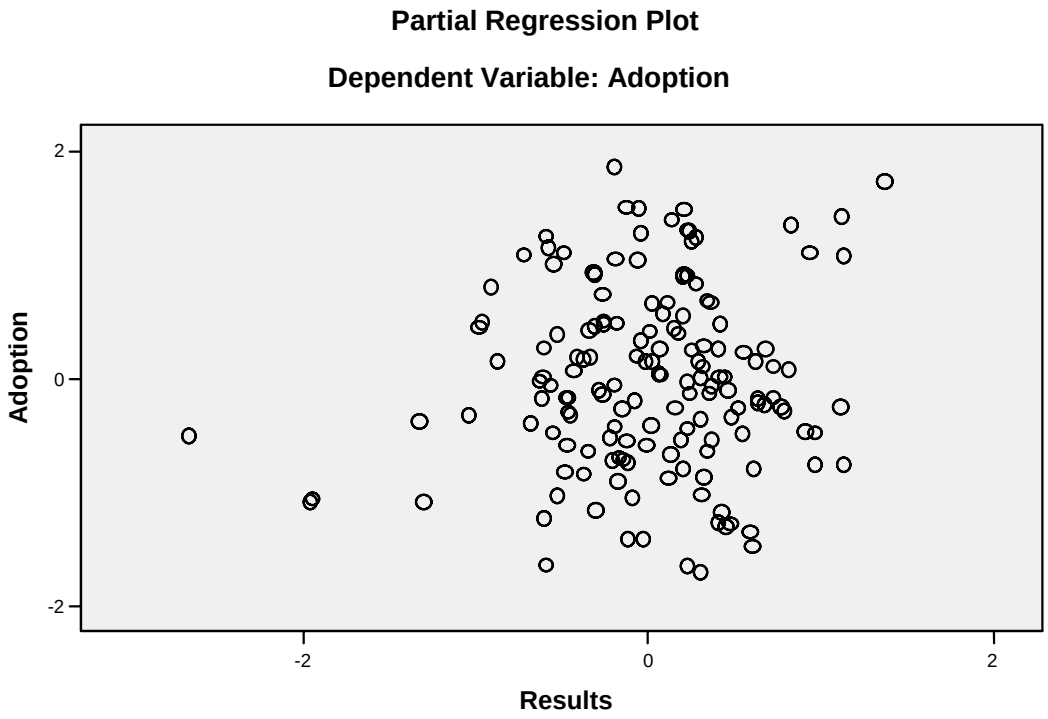
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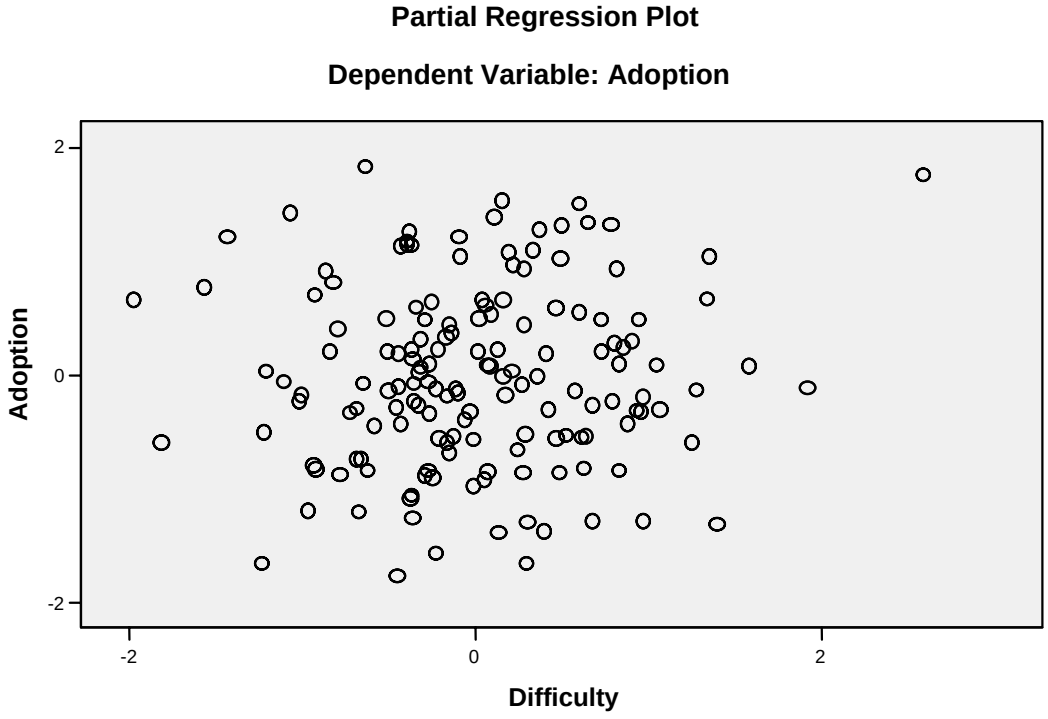
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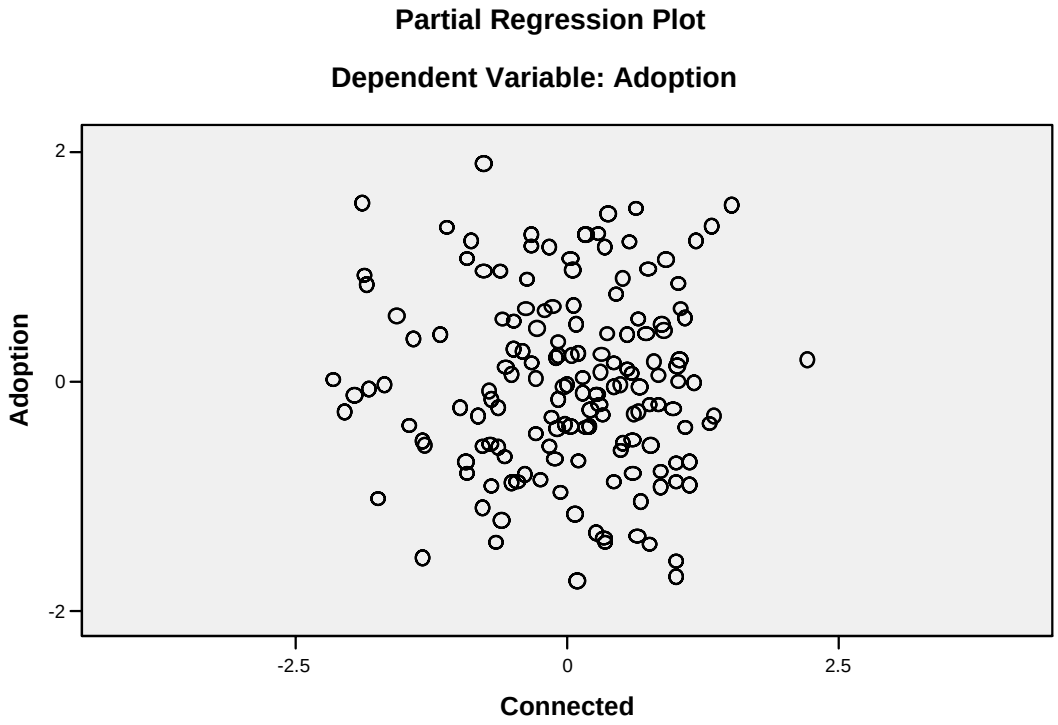
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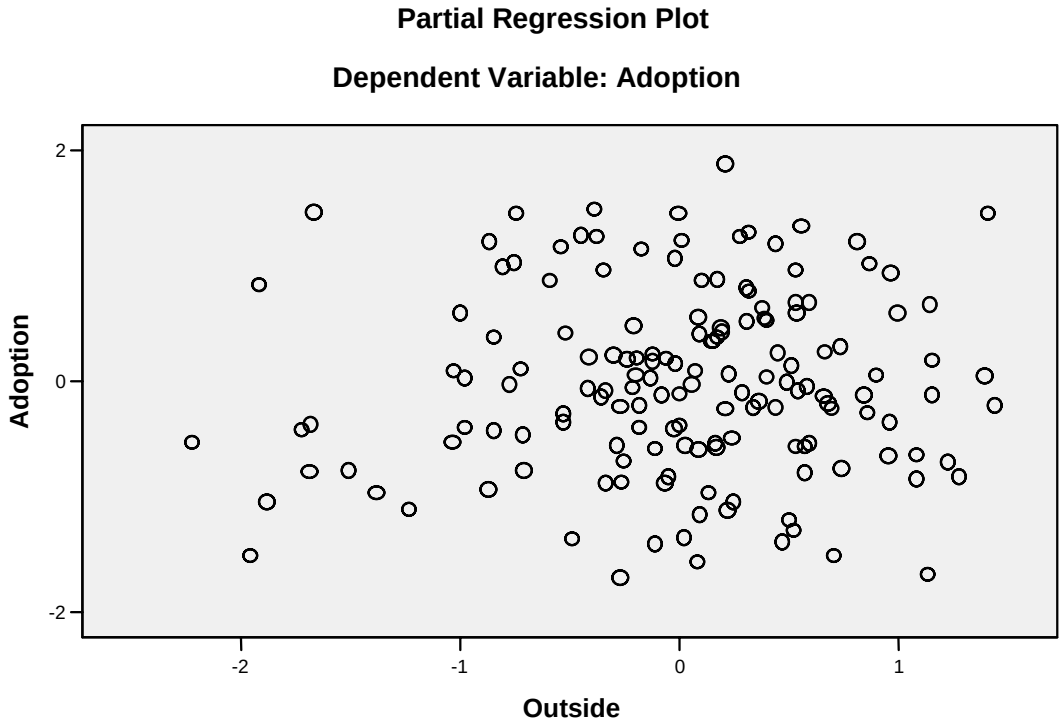
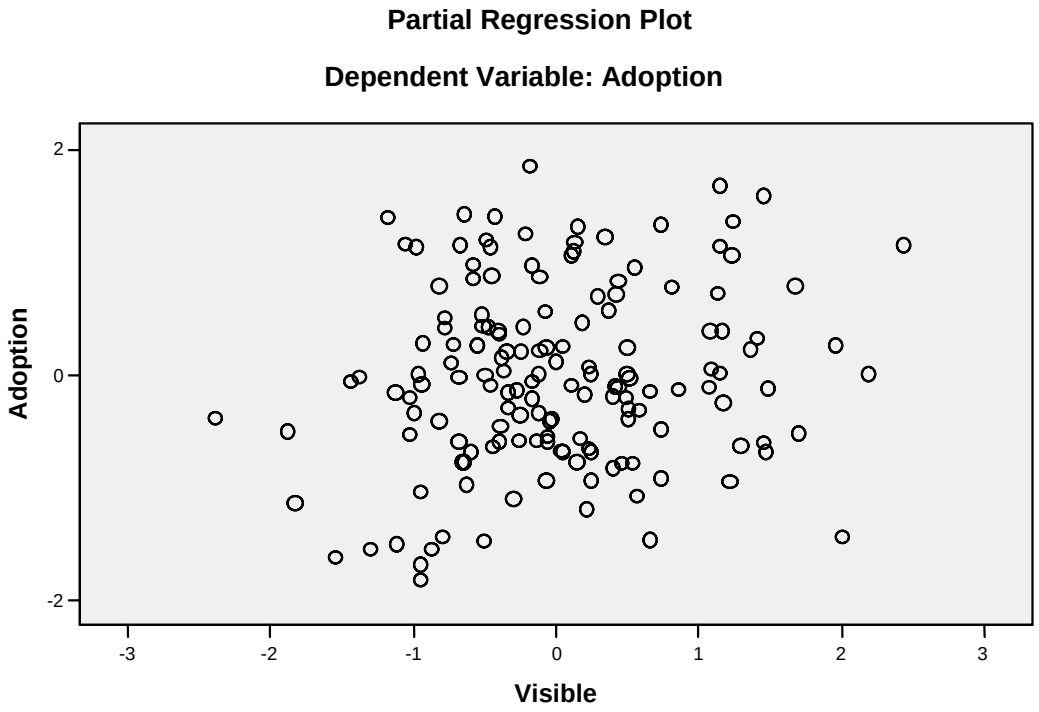
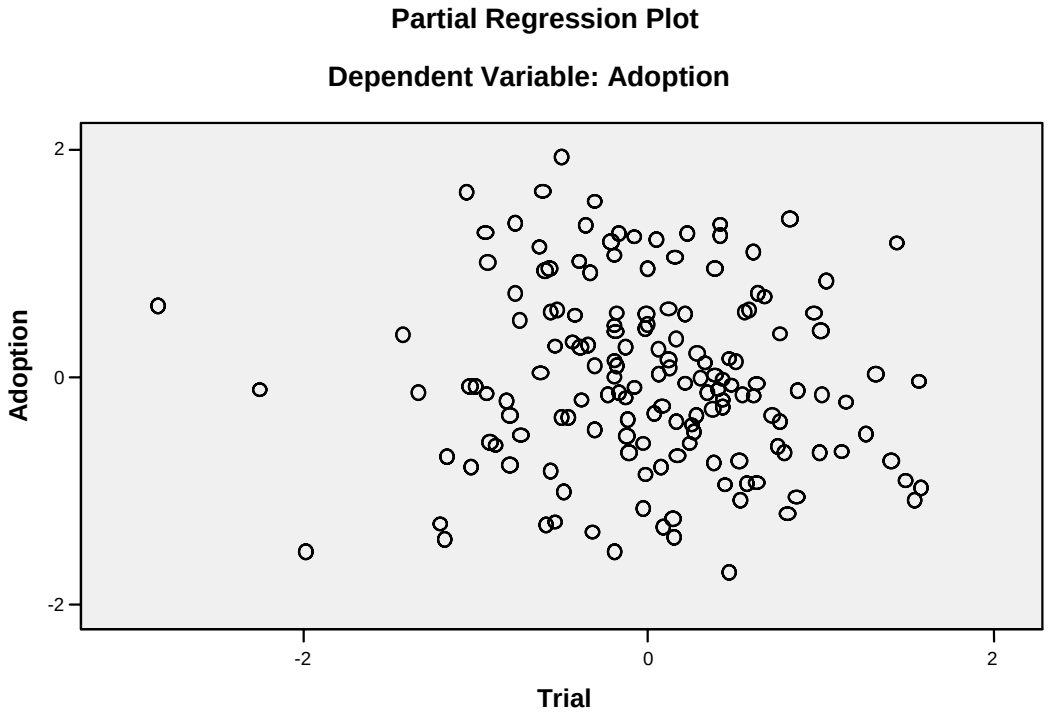
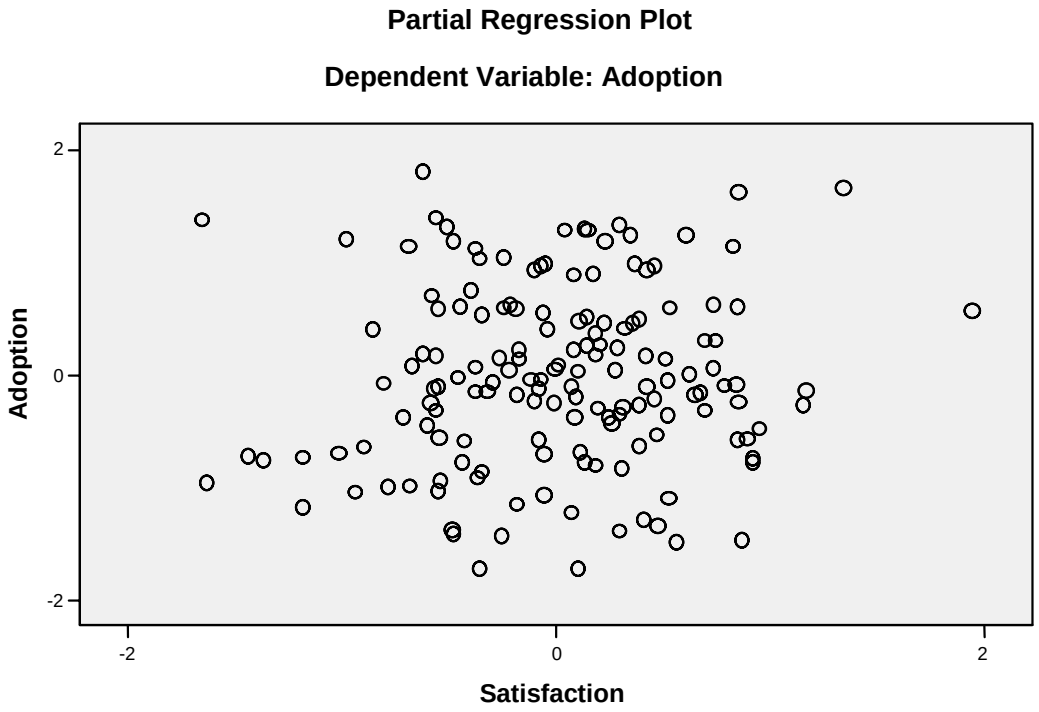
2.5
Connected


Partial Regression Plot
Dependent Variable: Adoption
Adoption
2
0
-2
-2
-1
0
1
Outside


Partial Regression Plot
Dependent Variable: Adoption
Adoption
Visible
2
0
-2
-3
-2
-1
0
1
2
3


Partial Regression Plot
Dependent Variable: Adoption
Adoption
Trial
2
0
-2
-2
0
2


Partial Regression Plot
Dependent Variable: Adoption
Adoption
2
0
-2
-2
0
2
Satisfaction

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